# The Dock and Harbour Authority

No. 290. Vol. XXV. Edited by BRYSSON CUNNINGHAM, D.Sc. B.E., F.R.S.E., M.Inst.C.E. December, 1944

## CONTENTS


| | | | |
|---|---|---|---|
| EDITORIAL | 163 | FREE PORTS IN MEXICO | 178 |
| THE THAMES CONSERVANCY | 165 | PUBLICATIONS RECEIVED | 178 |
| PORT OF LEITH | 169 | EARLY HYDROGRAPHY IN INDIAN SEAS | 179 |
| PROPOSED HARBOUR AT CARRADALE | 169 | TRANSPORT BETWEEN THE WARS | 181 |
| GREAT WESTERN RAILWAY DOCKS | 169 | HULL PORT AND CITY RE-PLANNING | 181 |
| NOTES OF THE MONTH | 170 | SHIP FIRES IN PORT | 182 |
| THE INVASION HARBOUR OF ARROMANCHES | 171 | CHAINS FOR HOISTS AND SLINGS | 183 |
| LEGAL NOTES | 172 | PORT OF RIO DE JANEIRO | 184 |
| THE FUTURE OF BRITISH PORTS | 173 | THE INSTITUTION OF CIVIL ENGINEERS | 184 |


# *Editorial Comments*

**River Conservancy Work.**

The association of rivers and harbours under single control is no unusual administrative feature. In the United States such a conjunction is the usual rule under the Federal Government and accordingly it includes all port works, since these are undertaken and financed by the State. There are examples without State control in this country, as for instance, the Conservancy Boards of the Tees and the Wear, whose jurisdictions comprise, respectively, the ports of Middlesbrough and Sunderland. Until comparatively recent times, the Thames Conservancy was responsible for the approaches to the Port of London. This association of rivers and harbours is by no means strange or surprising, since by far the greater number of ports are located on rivers or their estuaries, which afford naturally, and in many cases without artificial works, the requisite shelter for shipping.

Feeling that it would be of interest to our readers to have an article dealing with river conservancy work, we are including in this issue an article on the Thames. It will be seen that in the course of its long history, the river has seen some striking vicissitudes of administration, culminating in the present and, perhaps, final, phase of dual control.

The functions and duties of a river conservancy board are diverse and multifarious. In addition to promoting the use of the river for navigation, including the application of dredging to the bed and of rectification works to the banks, there is the necessity of dealing with irregularities of flow, due to floods in rainy seasons and depletion of water in times of drought. Excessive current velocity and instability of the navigable channel have also to be guarded against. If the river is a source of water supply for domestic purposes, a minimum flow must be guaranteed and the stream kept free from pollution, sewage being excluded, or its influx rigorously controlled. Fisheries and pleasure boating have also to be encouraged.

In navigable rivers with ports on their banks, deepening operations may have to be undertaken where practicable, for increasing the depth available for deep-draughted vessels. There is also the necessity of installing a system of buoyage to mark the navigable channel, the course of which must be kept clear of obstruction, involving the removal, in certain cases, of wrecks. A conservancy has also to provide moorings for craft.

Most, if not all, these numerous duties have devolved at one time or another on the Thames Conservancy Board.

**Port Administration from an Engineer's Standpoint.**

As is distinctly appropriate and, indeed, was confidently to be expected, the Presidential Address of Mr. F. E. Wentworth-Sheilds to the Institution of Civil Engineers, on assuming office on November 7th, was mainly devoted to a consideration of the forms of port administration at present existing in Great Britain, and of their possible replacement by some system of centralised control. The Address will well repay careful study; it is reproduced on a later page.

Mr. Wentworth-Sheilds enjoys such high prestige in maritime engineering circles and his opinions on port affairs, based on long and intimate experience of port work, carry so much weight, that we must confess to some slight disappointment that, in his masterly handling of an admittedly difficult and contentious subject, he did not see his way to indicate more precisely the form of centralised control which he had in mind, though he certainly stated his opinion that it should not be the full control at present exercised by the Government through the Ministry of War Transport, and he added that there would still be need for local administration to institute schemes and to conduct the business of the port.

This leaves us with rather a wide field for conjecture, into which we must not venture too far lest, inadvertently, we misrepresent his views. We imagine, however, that centralised control must inevitably mean control by a Government department, and sufficient has been said in these columns to make manifest our antipathy to any extension of bureaucratic methods in port administration. If Mr. Wentworth-Sheilds' central authority could be constituted so as to act as an advisory body, with executive powers limited to the assignment of money grants to approved schemes, in cases where these are found to be necessary on account of local inability to provide them, and to the handling of matters of national import, we conceive that the majority of our readers would concur. This arrangement would leave the local authority a free hand in managing their own internal affairs, for, when all is said and done, it must be admitted that the men on the spot are likely to be better judges of their particular port needs and requirements than any board of government officials sitting in Whitehall.

The fact that there are at present no less than five distinct and dissimilar systems of port administration in Great Britain does not perturb us in the least. The great majority of ports in this country are operated with conspicuous ability, whatever their system of

## *Editorial Comments*—*continued*

management, and we suggest that the British people, with their genius for individual initiative and enterprise are not enamoured of rigid uniformity in conducting their business affairs.

> " Variety's the very spice of life,
> That lends it all its savour."

wrote the poet Cowper, and during our visits to many ports, both at home and abroad we have found that there is abundant scope for individuality without sacrifice of efficiency. We do not think that diversity of management is necessarily objectionable—on the contrary, in differing circumstances it is distinctly beneficial.

And here we feel impelled to utter a word of warning. The wine of reconstruction-planning is very heady and tends to provoke a thirst for longer and deeper draughts than are altogether desirable. At the present time, the public are being surfeited by a plethora of plans and post-war development schemes. Housing, town planning, employment, social services and numerous other matters are all claiming their urgent attention as the subjects of programmes of vast and indeterminate extent. Some of these are good, even excellent, but in other cases, there is an element of experiment and unpredictable development, which should make the nation hesitate to embark upon them without the fullest reflection as to the possible consequences.

Let us confine ourselves, as is proper, to the domain of future port administration. Would it not be well for the Government and their technical advisers to bear in mind the sage and pregnant injunction: *Festina lente*, which may be rendered: " Make haste with caution." If institutions and organisations of long standing are serving their purpose efficiently and well, why disturb them, merely for the sake of change? They may not altogether commend themselves to advanced modern ideas and they may be lacking in uniformity—but the essential test is: do they work satisfactorily? If so, why not allow them to continue to function, subject, of course, to such adjustments as may be rendered desirable by special local, or regional, circumstances? As our French friends say: *Le mieux est l'ennemi du bien*, meaning: Let well alone. The governing authorities of the nation should be the last to follow the example of the Dog with the Bone, in Æsop's Fable, and throw away the substance for the shadow, even in the sacred name of Progress.

### A Maritime Experiment Station.

There is a suggestion included in the Presidential Address which the Government would do well to take into serious consideration. Mr. Wentworth-Sheilds alluded in terms of justifiable commendation to the work carried on at the Waterways Experiment Station at Vicksburg in the United States. We have on several occasions described in these columns the nature of certain of the experiments made and the valuable conclusions to be drawn therefrom, as affecting dock and harbour works. Like Mr. Wentworth-Sheilds, we feel it would be an admirable thing to have a similar station in this country. There are so many problems relating to the lay-out of harbour works, to wave and tidal action and to current flow, which can best be solved with the aid of scalar models, that no time should be lost in installing a station with the necessary apparatus and equipment. The cost would be amply repaid by the knowledge gained and by the avoidance of mistakes which might otherwise be made, possibly with disastrous results.

There are other foreign examples besides the station at Vicksburg. There is a Netherlands Government Hydraulic Laboratory at Delft in Holland, and another under Swiss auspices at Lausanne. Also, there is already in this country a Department of Scientific and Industrial Research, which might easily be expanded to cover these maritime investigations. It would not then be necessary to carry out important experimental model work with private means and resources, as has had to be done in the past. In saying this we do not wish to under-rate the value of the work carried out in recent years by British investigators at University laboratories and elsewhere in this country, as acknowledged in the Presidential Address. It has been admirable in method and fertile in results. But it does not quite meet the needs of the present day.

### Ship Dimensions.

Possible, and especially likely, developments in ship dimensions must always be a source of interest and concern to port authorities and the recent presidential address to the University of Glasgow Engineering Society by Dr. James McNeill, the distinguished naval architect of the firm of Messrs. John Brown and Company, who designed the *Queen Mary* and the *Queen Elizabeth*, contained pregnant observations for consideration. In the course of his address, in which he emphasised the essential value of shipping to international trade, Dr. McNeill affirmed that there was no present indication to show that the growth in dimensions of vessels would be arrested, although on grounds of cost the rate of growth might be slowed down for a period. The tendency to increase in size would, he said, be most marked in the intermediate type of vessel, in which increased standards of accommodation and space requirements would result in a build-up of the top structure. This would result, in turn, in increase in beam. Length, being the most expensive dimension to change, although the most profitable in relation to powering, would probably increase more slowly.

The most striking application of these expert prophecies will undoubtedly be in relation to the design of new graving docks. Most quayage accommodation at ports will, no doubt, suffice for, or can be adapted to, a somewhat larger type of vessel than the present maximum, but dry dock accommodation, like the Bed of Procustes, is rigidly exact, and does not admit of occupation in excess of definite limits. We have already alluded to this fact in commenting last month on the proposal to build an additional graving dock at Dundee. The problem confronting the Harbour Trustees at this port is common to all port authorities, and we are afraid they will not find much comfort or satisfaction from Dr. McNeill's expert anticipations. Where the data are so uncertain, the element of chance enters largely into the calculations, and the only hope is that the result will be a " happy guess " which, after all, is the utmost that the most careful estimate can claim to be.

### The Institute of Transport.

In proposing the toast of The Institute of Transport at the luncheon on November 5th in celebration of the Silver Jubilee of the Institute, Mr. Herbert Morrison, the Secretary of State for Home Affairs and Minister of Home Security, rightly laid stress on the distinguished service rendered by transport to the Nation at the present time, and particularly as regards war transport, of which there have been striking illustrations given of late in the press, including, we venture to interpose, the achievements of shipping and the ports. He emphasised that these transport services had entailed careful organisation and co-operation, and went on to say that there would come a time, for which preparation must be made, when the Ministry of War Transport would become the Ministry of Peace Transport. Problems would then have to be faced in unwinding some of the regulations for war in favour of those more suitable for the organisation of transportation in peace. " The transport industry must therefore be ready to eliminate its dead matter and those obstructive factors in development which were holding it down and also to get rid of out-of-date methods."

All this is true, though slightly platitudinous, and we trust the cap will be worn by whomever it may fit. For ourselves, we do not think that any branch of transport, certainly not that associated with ports and shipping, has occasion to feel reproached for not adapting itself readily and rapidly to changing circumstances, so far as it has lain in its power to do so. The transport industry has responded with alacrity and efficiency to the exacting conditions imposed by the war, and will continue to function not less satisfactorily in the more favourable circumstances of peace.

In this, much has been due to the fostering influence of the Institute of Transport during the quarter century of its existence, and in complimenting the Institute on the attainment of a notable stage in its history, we are sure that all our readers will join in good wishes for its continued progress and the extension of its valuable activities.

A pamphlet descriptive of these activities, as issued by the Institute, is noticed elsewhere.

# The Thames Conservancy

## Its Jurisdiction, Functions and Responsibilities

By THE EDITOR.

### The River Thames

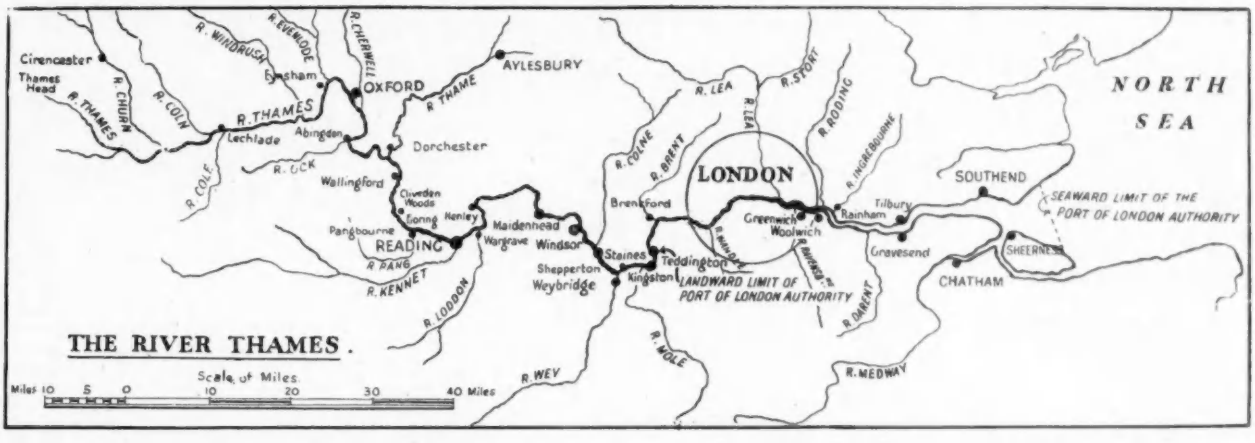
ALTHOUGH not actually the longest English river (the Severn is longer by 10 miles) the Thames is, undoubtedly, the chief river of England by reason of its commercial importance, and the fact that the capital of the country stands on its banks. As is common with all rivers, it pursues a winding course, the general direction being from West to East, but a marked North to South deviation between Oxford and Reading, followed by a reverse bend, then by a further southerly trend to Chertsey, its most southerly point. Its source is in the County of Gloucester, the locality, generally accepted among several claimants, being the spring at Thames Head in the parish of Coates, three miles west of Cirencester and within 20 miles of the Severn Estuary. From Thames Head to London Bridge is a distance of 161¼ miles and from the latter point to the Nore, the outermost limit of its course, is another 47¾ miles, making a total length of 209 miles. The width of the river varies considerably, being about 150 feet at Oxford, 250 feet at Teddington, 750 feet at London Bridge, just over 2,000 feet at Gravesend and some 5½ miles immediately above the Nore. In the course of its passage to the sea, there is a fall in level from source to mouth of 356 feet.

The drainage area of the Thames is divisible into two topographical basins: one nearer the source to the West and the other in what may be termed the London Area, between the Chilterns and the North Downs. The river passes from one basin to the other through the Goring Gap, a little above Reading. There is a total of 3,812 square miles of watershed above Teddington Weir, expanding to 6,000 square miles by the time the river reaches the sea.

The tributaries of the Thames are numerous. Starting from the source they include the Coln at Lechlade, the Windrush at Newbridge, Standlake, the Evenlode at Eynsham, the Cherwell at Oxford, the Ock at Abingdon, the Thame at Dorchester, the Pang at Pangbourne, the Kennet at Reading, the Loddon at Wargrave, the Colne at Staines, the Wey at Shepperton and the Mole at Hampton Court. Below Teddington, the river is tidal and becomes an estuary in which the principal influents are the Brent at Brentford, the Wandle at Wandsworth, the Ravensbourne at Deptford, the Lea at Blackwall, the Darenth just below Erith and the Ingrebourne at Rainham. The Medway, an independent river, enters the estuary at Sheerness.

### The Thames Conservancy

Long before the creation of the body known as the Thames Conservancy, there were in existence authorities charged with the maintenance of the river channel, the earliest of which was the Corporation of the City of London, whose jurisdiction dated back to 1197 in the reign of Richard I, but it is doubtful if it extended to the whole length of the river. By a charter dated 1605 (James I), the jurisdiction of the Corporation was limited " from the bridge of the town of Staines to Yantlet towards the sea." The first pound locks to be built on the Thames were constructed under an Act passed in the year 1623 (James I) by a body known as the Commissioners of Sewers and consisted of three locks at Iffley, Sandford and Abingdon for " the improvement of the river from the village of Bercot unto the University and City of Oxon." The river between Cricklade and the boundary of the City Corporation at Staines was placed in 1750 under the control of a body called the Thames Navigation Commissioners.




Early in the 19th century, a dispute arose between the Corporation and the Crown respecting their proprietory rights in the river bed and foreshore. This led to the passing of an Act in 1857 which settled the dispute by creating a Board of Conservators consisting of 12 members, of whom the City nominated six, in addition to the Lord Mayor, *ex officio*, chairman, the Admiralty, two, the Board of Trade, one, and Trinity House, two. In this body of Conservators was vested the whole of the " estate, right, title and interest " of the Crown and Corporation in the " bed, soil and shore " of the Thames from Staines to Yantlet Creek.

As regards the Thames Upper Navigation Commissioners, previously mentioned as in charge of the river above Staines, it has to be stated that they were a cumbersome body of some 600 to 700 members, representing every conceivable sort of interest: civic, academic, parliamentary, ecclesiastical, county and private. As might be expected, they proved incapable of carrying out their duties with any degree of efficiency. So, following a Parliamentary enquiry, it was deemed advisable to abolish them and transfer their duties and responsibilites to the Conservancy Board created, as stated above, for the lower river. The change was effected in 1866, when the number of Conservators which had been increased to 18 in 1864, was further risen to 23.

The powers conferred on the Conservancy Board at this time included the right to levy tolls and to make bye-laws for the regulation, management and improvement of the river and its navigation.

## *The Thames Conservancy—continued*

Further powers of a minor nature were added by several Acts passed between 1867 and 1885.

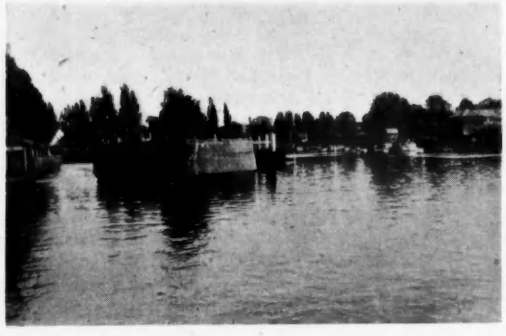
In 1894, a more thorough and drastic change took place. The number of Conservators was increased to 38 and included 24 representatives of riparian municipalities and county councils. They were to receive remuneration for their services, an annual sum of £3,100 being allocated for this purpose. The Conservancy was given very extensive powers as regards dredging the river for the improvement of the navigable channel, prevention of pollution and the registration of pleasure boats was entrusted to them. They were given authority to charge tonnage dues on shipping and an increased payment was to be made by the Water Companies for the supplies they abstracted from the river.

(Courtesy of *P.L.A. Monthly*)
Gravesend Reach.

At this epoch the most pressing question was the deepening of the lower river below London Bridge to meet the requirements of modern sea-going vessels. Giving evidence before a special Commission—the Lower Thames Navigation Commission—shipping interests called for a low water depth of 30 feet up to Gravesend; indeed, some shipowners wanted it extended to the Albert Dock. Despite the recommendation of the Commission in favour of deepening to 30 feet, the Conservancy, for various reasons, took no responsive action and limited their dredging programme to a channel 26 feet deep between the Nore and Gravesend, 24 feet deep thence to Crayfordness and 22 feet deep to the Albert Dock. This programme was claimed to be completed by the end of 1900.

(Courtesy of *P.L.A. Monthly*)
Upper and Lower Pools with Tower Bridge.

It was, however, the cause of much dis-satisfaction. Public agitation, not only about it but in other directions concerning the administration of the docks under private companies, led to the appointment of the Royal Commission of June, 1900. Very wide questions were involved, into which it is unnecessary to enter here. The outcome was, briefly, the establishment of the Port of London Authority in 1909, to take over the entire control of the river from the sea as far as Teddington, the Thames Conservancy retaining the river above that point. Numerical changes were made in the constitution of the latter body at this date, in 1919 and again in 1930, in consequence of the passing in that year of the Land Drainage Act, which enlarged the scope of its duties. At the present time, there are 34 constitutent members under the chairmanship of Captain Jocelyn Bray. Lord Desborough, the former chairman, who retired in 1937 after 41 years of untiring service, for 32 of which he was chairman of the Board, left behind him a great and enduring record of public work.



(Courtesy of *P.L.A. Monthly*)
Teddington Lock and Weir.

### River Improvements

We now turn to certain definite achievements standing to the credit of the Conservators in fulfilment of their obligations past and present. Reporting on their work in 1863, a select Parliamentary Committee said:

"With a revenue of about £40,000 they have in the course of five years entirely removed, or greatly diminished, all the shoals between London Bridge and Barking Creek, which narrowed the waterway and obstructed navigation; they have laid down in well-chosen stations secure and commodious moorings for vessels riding in the stream; they have organised and enforced a system of regulation on the river which has greatly facilitated its immense and complicated traffic; they have done something towards the rectification of the channel; they have, as far as possible, protected the river from the practices of those who would make its bed the receptacle of mud and rubbish and who poisoned its waters with impurities. Finally, out of the capital funds at their disposal, they have erected at various points on the river banks improved piers and landing places, which have not only afforded great accommodation to the thousands of passengers who daily crowd the highway of the Thames, but have opened to the lighters and small craft plying on the river, an inshore passage, obstructed or blocked up by the former landing places."

(Courtesy of *P.L.A. Monthly*)
The Thames at Cliveden.

## *The Thames Conservancy—continued*

Photograph: *Mr. J. Dixon Scott*] STRAND-ON-THE-GREEN. [Reproduced by permission from *The Sunday Times*

**Although now entirely surrounded by London suburbs, Strand-on-the-Green was until the middle of the eighteenth century an isolated waterside hamlet lying between Chiswick and Kew. It has, however, lost nothing of its attractive old-world character. The earlier air-raids on London caused a few gaps along the riverside, and rebuilding on those sites causes local residents anxiety as there have been suggestions to build modern blocks of flats after the war. But this very self-contained hamlet is still a jumble of inns, fine old Georgian houses and humble cottages It also has its dockyard, a place of considerable industry at present.**

This, of course, it is to be noted was prior to the transfer of the estuarial portion of the river to the Port of London Authority.

In the upper portion of the river, consisting of 47 reaches of varying lengths, there have been constructed 50 locks, formerly called " pound locks," 50 main weirs, 17 subsidiary weirs and 10 overfalls. Some of the weirs had existed " for ages," but many of them have been re-built and strengthened within recent times. Before the construction of the locks, vessels navigating upstream had to be forcibly hauled through a temporary opening made for the occasion in a weir, called a " flash pass," the pull being exerted against the full force of the escaping flow. A little more than ten years ago, there were still four of the flash passes in existence, but these have since been removed or replaced by locks of standard type. A typical modern lock on the Thames has a length of 200 feet and a width of 24 feet.

### The Henley Regatta

The subject of boating leads on to the great social and sporting function of the Henley Regatta, which, founded in 1830, has been a memorable annual event ever snce, second only in importance to the University Boat Race. The latter, rowed between Putney and Mortlake, is no longer held under the auspices of the Conservancy. The Regatta is managed by Regatta Stewards, the responsibility of the Conservancy being the maintenance of the course. In this, there have been one or two changes. Before 1886, the races started at the upper end of Temple Island and finished at Henley Bridge; in that year a new course was instituted, starting at the lower end of the island and finishing at the upper end of the wall of Phyllis Court lawn. The length of the course is 1 mile 550 yards. In 1924, the course was improved and straightened by widening the river opposite the lower end of Temple Island.

### Water Supply

The river is the source of supply for a number of statutory water undertakings, viz: the Metropolitan Water Board, the South-West Suburban Water Company, the Woking Water and Gas Company and the West Surrey Water Company. The Corporation of Oxford also abstract water at Oxford and the Corporation of Reading from the Kennet.

The primary source of all fresh water supply is, of course, rainfall and the average annual rainfall in the Thames Valley is a little over 28 inches, the lowest during a period of half a century being 16.52 inches in 1921 and the highest 40,87 inches in 1903. The average daily natural flow in the river for the standard period 1885—1917 is 1,357 million gallons. A flow of more than 4,500 million gallons per day at Teddington represents flooded conditions, while a flow of less than 400 million gallons is regarded by the Conservancy as a low flow. The Metropolitan Water Board has power to take an annual average up to 300 million gallons per day but abstraction must not reduce the flow below 170 million gallons daily. The maximum recorded natural flow on any one day was 20,236 gallons on the 18th November, 1894, and the minimum 140 million gallons on a day in July, 1934.

Flooded conditions occur in certain localities on the average on 10 days in the year. There are something like 314,000 acres in the valley lying more than eight feet below the highest known flood level.

### Drainage

This introduces the subject of land drainage. Since 1930, consequent upon the passage of the Land Drainage Act of that year, Catchment Boards have been constituted for all the leading rivers in England and Wales, with Internal Drainage Boards as subsidiary bodies to deal with minor streams. In the case of the Thames, these Internal Drainage Boards were abolished in 1938, and there

## *The Thames Conservancy—continued*

is now a total of 1,419 miles of " main river " under the direct administration of the Conservancy. The improvement of this drainage system has been a special concern of the Conservators in recent years.

### Other Improvements

As a result of what is known as the Thames Improvement Scheme, costing a sum of £300,000, the river below Shepperton now enables a discharge of 7,500 gallons to pass at Teddington before flooding occurs between Shepperton and Teddington. A sum of £240,000 has been expended on the improvement of the Wey tributary and a number of other watercourses have similarly received attention. Owing to the necessity of maintaining a steady supply and at the same time guarding against sudden excess, constant supervision has to be exercised in the regulation of water level at the respective weirs.

### Dredging

Freshets and floods tend to accentuate the incidence of silting in the channel. Detritus is brought down from the uplands and deposited in quiescent areas, where is gradually accumulates until it becomes an impediment to navigation. The quantity of solid matter suspended in Thames water reaches 3.78 grains per gallon when the flow is 4,500 million gallons per day at Teddington. The Conservators have several steam dredgers constantly at work on the large shoals, those of less extent being removed by hand appliances.

### General

There are many other aspects of the Conservancy's work which deserve notice though within the limits of this article it is not possible to deal with them all. There is the service in regard to the Prevention of River Pollution, necessitating a staff of two chief inspectors and 17 inspectors to obtain samples of discharges from possible sources of contamination, to arrange for samples to be analysed and to see that the requisite degree of purity is observed. There is the registration of pleasure craft and the inspection of motor launches and machinery. There is the supervision of fisheries, requiring the watchful care of water bailiffs to ensure the observance of close seasons and limitations in size of fish taken. Quite a quantity of coarse fish are to be found in the Thames, including pike, perch, roach, dace and barbel, while some fine specimens of trout are obtainable at the weirs. Perhaps one of the most attractive features on the river from the public point of view, though not inherently a responsibility of the Conservancy, is the presence of swans which breed and live a natural life on its waters, being occasionally found as far down the estuary as the docks of the Port Authority. An annual marking or " upping " takes place at the end of each July at various points up to Reading. The swans are owned respectively by H.M. the King, the Vinters' Company, and the Dyers' Company. A Swan Master represents each of the separate interests at the upping season.

### Acknowledgment

In concluding this short survey of the work of one of the best known and important river authorities in the country, the writer desires to express his indebtedness to Mr. R. V. W. Stock, M.C., B.Sc., M.Inst.C.E., the Chief Engineer of the Conservancy, for the documentary information placed at his disposal and for his helpful suggestions. The Secretary, Mr. G. E. Walker, M.A., LL.B., should also receive mention.

All Englishmen take a pride in the Thames and it is an undoubted source of satisfaction to them to know that the care and administration of the river is in the hands of so competent a body as the Thames Conservancy have proved themselves to be.

---

## APPENDIX.

An article containing some additional particulars by a member of the Secretary's Department appeared recently in a contemporary Journal. The following are excerpts from the article.

## SOME NOTES ON THE THAMES CONSERVANCY*

By W. G. BARCLAY, M.I.S.E., M.R.San.I., M.Inst.S.P.

The jurisdiction of the Conservators as a Navigation Authority extends over a distance of about 136 miles of river, namely, from Cricklade (Wilts) to Teddington (Middlesex); and for the prevention of pollution the powers of the Conservators extend over the whole catchment area of 3,812 square miles, comprising portions of the counties of Warwickshire, Worcestershire, Wiltshire, Gloucestershire, Oxfordshire, Northamptonshire, Berkshire, Buckinghamshire, Bedfordshire, Hertfordshire, Hampshire, Surrey, Middlesex, East Sussex and West Sussex.

The statutory powers and duties of the Conservators under the Thames Conservancy Act, 1932, are briefly as follows:—

the construction and maintenace of locks, weirs and all other works necessary for the carrying on of the navigation;
establishment and maintenance of ferries;
appointment of water bailiffs for the protection of the fisheries;
regulation of the water levels;
removal of sunken vessels;
removal of obstructions from the river and towpaths;
dredging for the purpose of maintaining and improving the navigation;
maintenance of the flow and the prevention of pollution of the river and all tributaries and streams connected with it;
granting of licences for works in the river;
registration of steam launches, houseboats and pleasure boats, and the regulation of these vessels;
making of byelaws for a number of purposes;
regulation of the navigation; and the
prevention of pollution from vessels.

The Conservators' income is derived from a number of sources, chief among which are:—Contributions by the Metropolitan Water Board, water companies and other authorities who abstract water from the river; contributions by the Councils of Counties and County Boroughs; tolls on pleasure and merchandise traffic; registration of vessels; and sale of ballast.

The following are the powers and duties of the Conservators as the Drainage Board of the Thames Catchment Area:—

General supervision with respect to the drainage of the Thames Catchment Area.
Exclusive powers and jurisdiction with respect to the " main river " and the banks thereof, and with respect to drainage works in connection therewith, improvement of existing works, and construction of new works, the cleansing, repairing, deepening, widening and straightening of the " main river," and generally maintaining it in a due state of efficiency.
The promotion of or opposition to Bills in Parliament and the application for or opposition to Provisional or other Statutory Orders.
The purchase, sale or exchange of land, including the power to acquire compulsorily by means of an Order.
The making of byelaws to secure the efficient working of the system of drainage.
The appropriation and disposal of dredged material.

For the administration of the Conservators' powers for the prevention of pollution, the area of 3,812 square miles is divided into two areas, roughly east and west of Reading respectively, with a Chief River Purification Inspector in each area. Such areas are subdivided into seven districts, each in charge of an Inspector with one or two assistants, according to the size of the district. The districts are arranged so that each completely covers the catchment areas of a group of tributaries.

On the engineering side, the main river and land drainage work for the same area is divided into three divisions, each supervised by a Divisional Engineer, whose headquarters are situated respectively at Oxford, Reading and Sunbury. The Conservators' works at carried out by their own staff, with plant and craft also belonging to the undertaking.

---

* Reproduced from the *Journal of the Institution of Sanitary Engineers* October, 1943.

## *Port of Leith*

### *Post-War Prospects and Plans*

An increase in the trade of the Port of Leith during 1943-44 was reported by Mr. George Veitch, C.A., representative of the Edinburgh Chamber of Commerce on Leith Dock Commission, when he addressed the Chamber on the 8th November. The hope was expressed that Leith would recover a very large proportion of the Baltic trade lost after the war.

The total tonnage for 1943-44 of 1,437,943 tons, said Mr. Veitch, showed an increase of 145,250 tons. This, however, was only about half of the trade which the port was handling before the war, and much less than half of what they hoped to handle in the years ahead.

During the financial year 195,980 tons of grain were discharged from 82 vessels by the Commissioners' grain discharging plant, and stored in the two warehouses within the docks.

The Commissioners were still giving careful consideration to the question of the post-war development of the port, and were particularly considering (1) the adequacy of the available facilities at the port, and (2) the development of the Western Extension Scheme.

With regard to existing facilities, the officials had prepared a scheme which envisaged the installation of electric crane equipment, and the reconstruction of quays and sheds with road and rail communications throughout the docks. It would involve considerable expenditure, and would have to be spread over a number of years.

With regard to the development of the Western Extension Scheme, the Commissioners had received many applications from firms and companies for factory sites and commercial premises for the development of their business. These applications were receiving careful consideration, and in addition, the Commissioners had discussed with representatives of various interested bodies their views as to facilities which would be required for their businesses in the post-war years.

In the light of information received, the Commissioners were considering the expenditure of reclaiming more land for industrial sites, and leaving less water space, in the development of the Western Extension, but, while the Commissioners were fully alive to the interests of general trade in the post-war expansion of the port, they were governed by statutes, as a dock authority, which prohibited them from selling or feuing, and, in certain circumstances, from leasing, land within their dock estate, except for purposes connected with the trade of the harbour and docks.

It seemed likely, said Mr. Veitch, that as Leith and the Firth of Forth opened out towards the Continent of Europe there would be scope for considerable trade after the war, and it was hoped that Leith would recover a very large proportion of the Baltic trade which was lost after the World War No. 1. Consequently the problems which faced them in this matter of dock extension must receive the most careful study.

**Tyne Improvement Commission.**

A number of improvement schemes for the development of the Tyne docks are stated to be under consideration by the Tyne Improvement Commission. These include new coaling staithes at Tyne Dock, estimated to cost £500,000; an extension of the Sutherland Riverside Quay at Tyne Dock, to cost £550,000, and an new 100-ft. quay on the West side of Tyne Dock. There is also a scheme for the general development of the Northumberland Dock on the opposite side of the river, to cost about one million. Altogether, an expenditure of three millions is envisaged.

**Proposed Coaling Facilities at Aberdeen Harbour.**

The Aberdeen Harbour Commissioners at their last meeting instructed the harbour engineer to prepare for their consideration a coaling scheme, to be carried out at the Pocra Quay. This proposed development is in addition to the scheme of improvements approved by the Board in June, which, at an estimated cost of £485,000, makes provision for a deep water berth, harbour deepening, the widening of quays, a new bridge and the installation of cranes.

## *Proposed Harbour at Carradale*

A resolution passed unanimously at a meeting of the Clyde Fishermen's Association, asking for support in the scheme by the fishermen of Carradale, Kintyre, for a Government grant for the construction of a harbour at Carradale was considered at a meeting of Argyll County Council at Oban recently.

Provost A. D. MacNair, of Campbeltown, chairman of the Association said the Carradale fishermen had accumulated sufficient money to buy the existing pier and hand it over free of charge to the County Council. They were also prepared to pay pier dues for all fish landed. The revenue would be more than sufficient to meet the costs. The County Council were asked to maintain the pier and harbour.

The Secretary of State for Scotland, at a recent meeting at Carradale, had recommended the fishermen to approach the County Council to press their claim, and they were hopeful that a grant would be available for the harbour immediately after the war.

The Clyde fishermen expected big developments in the fishing industry, and the proposed harbour would accommodate all the fishing fleet as well as benefit the port in other ways.

The County Council has decided to make enquiries into the state of the harbour at Carradale before taking any action in the matter.

## *Great Western Railway Docks*

In an interesting exhibition arranged by the Permanent Way Institution, held in October, at the National Museum of Wales, Cardiff, there was included a large stand containing photographs

G.W.R. Stand containing photographs of Docks and their facilities.

of the Great Western Railway Company's docks in South Wales, which illustrated the up-to-date facilities provided at these ports and the methods of discharging and loading the many varieties of cargo dealt with.

**Port of Dublin and Transatlantic Shipping.**

At a recent meeting held in Trinity College, Dublin, Commander O'Brien-Twohig, Harbour Master of the Port, dealt with the necessity for providing better accommodation at the Port of Dublin for transatlantic shipping. He stated that an essential complement of an efficient marine service was adequate and efficient port service. With the development of an Irish mercantile marine there must be, in that port, adequate and efficient storage and cargo facilities for overseas as well as for cross-channel traffic.

# *Notes of the Month*

**New Liberian Port.**

The Government of the United States is reported to have undertaken to provide the negro republic of Liberia in West Africa with a port, the size and exact locality of which are not indicated.

**Transfer of Port Medical Officer.**

Dr. M. T. Morgan, Medical Officer of Health for the Port of London, has been seconded by the Corporation of London to work with U.N.R.R.A.

**Death of Harbour Board Member.**

The death is announced, at the age of 74, of Mr. Andrew Coutts Horne, a member of the Cork Harbour Board, a representative of many well known shipping firms, and Hon. Vice-Consul for Sweden.

**Completion of New Quay at Durban.**

An interesting ceremony on October 26th marked the completion of a new quay or jetty, at the Port of Durban, Natal, the dimensions of which are 2,150-ft. in length and 75-ft. in width. Mr. F. C. Sturrock, the South African Minister of Transport, set the last bollard, which completes an undertaking costing £1,925,000 and providing shipping accommodation in Durban Harbour double its former extent.

**Retirement of Port Trust Member.**

Sir George A. Mitchell, who has been a member of the Clyde Navigation Trust since 1935, has retired, and at a meeting on the 7th of November of the Trustees, Mr. William Cuthbert, chairman, paid a tribute to the valuable services he has rendered as representative of the Merchants' House and to the helpful advice he had given during the period.

**Proposed Harbour for Worthing.**

The Town Council of Worthing have approved a recommendation of their Post-War Reconstruction Committee that the Borough Engineer and the Borough Treasurer should examine the cost of a proposed new harbour and bathing pool scheme, and make an estimate of the probable income. The proposal has been put forward by the Borough Engineer (Mr. P. E. Harvey, O.B.E.), as an advantageous way of clearing up the concrete block defences in the town. The depth at high water would be sufficient for small passenger-carrying craft.

**American Obituary.**

Three well-known men in North American port circles have recently passed away. **Colonel Arthur Edouard Dubuc,** D.S.O., V.D., M.E.I.C., Chevalier of the Legion of Honour, has died at Ottawa. Prior to his retirement in 1942, Colonel Dubuc was vice-chairman and Chief Engineer of the Canadian National Harbour Board. **Mr. Peter Ten Eyck** was the founder of the Port of Albany in the Hudson River in the State of New York. **Mr. Alfred Lambert** was formerly a member of the Montreal Harbour Commission and an ex-president of the Chamber of Commerce.

**Opening of Port Transit Shed at Melbourne.**

A new transit shed, 500-ft. long by 80-ft. wide, has recently been opened at the port of Melbourne in the State of Victoria, Australia. It is located at No. 15 berth, South Wharf. Advantage was taken of the ceremony, which was performed by the Premier, to arrange a working demonstration of a wide variety of port equipment, including cargo-handling, fire-fighting, salvage and other apparatus. The Chairman of the Harbour Commissioners, under whose direction the work was carried out, welcomed the Premier and the Lord Mayor, and said that port expansion had played an important part in the war effort. The Premier, in reply, said that the Government confidence in the Harbour Trust would be further reflected shortly in legislation to increase its borrowing powers from £ 5,000,000 to £7,500,000.

**Development of Swedish Coastal Lights.**

The Swedish Pilotage Board has submitted to the Swedish Government a report in which an expenditure of 16 million kroner during the next ten years is recommended for the provision of improved lighting arrangements for shipping along the coast line.

**Pacific Coast Port Association.**

At a recent conference of the Pacific Coast Port Association, held at Portland, Ore., Mr. Eugene Overton, the president of the Association, proposed the establishment of foreign trade free-port zones at Seattle, Portland, San Francisco and Los Angeles.

**Development of Port of Long Beach.**

A development programme estimated to cost about 60 million dollars, is well under way at the Port of Long Beach, California, U.S.A. At the present time the harbour has 17 berths capable of accommodating ships in 35 feet depth of water. The works now in progress will provide 35 new deep-water berths with possibly 23 more in the outer harbour.

**Bristol Channel Docks.**

A question was asked in the House of Commons on 14th November, respecting a report stated to have been sent to the Government by the Welsh Reconstruction Council respecting the future of the Bristol Channel Docks. Sir William Jowett, Minister without Portfolio, acknowledged that the Minister of Reconstruction had received such a letter, and was in consultation about it with the Minister of War Transport. It was not proposed to publish the letter.

**Prince of Wales Dry Dock Company.**

At the annual general meeting of the Prince of Wales Dry Dock Company, Swansea, Ltd., the interim dividend of 7½ per cent. plus bonus of 2½ per cent. was confirmed as final for the year. It was stated by Mr. Henry Barraclough, the chairman, that during the past eight years, from the time of the acquisition of Palmer's Dry Dock, followed in 1942 by the purchase of the Port Talbot Company, the dividend paid to shareholders had risen from 4 per cent. to 10 per cent.

**New Clearing House at the Port of New York.**

The Port of New York Authority announce that they have prepared plans for the construction of a road transport clearing house on Manhattan Island. It was explained recently by Mr. Frank Ferguson, the chairman of the Authority, that approximately two-thirds of the merchandise now entering and leaving the port area do so by road, so that the provision of a road freight station of substantial size has become essential. The new station is to be the largest of its kind in the United States. It will be a self-contained building, 1,000-ft. in length and 175-ft. wide. The estimated cost is two-and-a-half million dollars and construction is to be commenced as soon as the necessary authorisation is forthcoming and the materials are available.

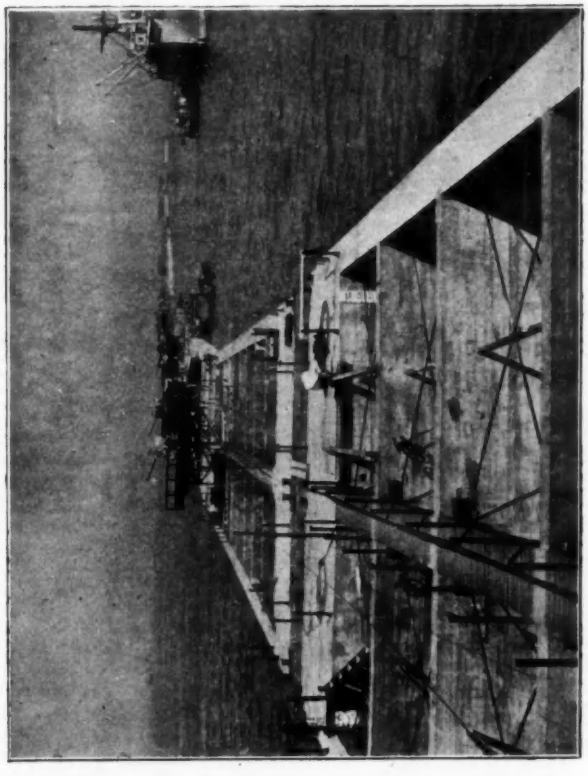
**Large Slipway Cradle at Port Elizabeth.**

An interesting contract recently completed for the South African Railways and Harbours Administration is that of a slipway cradle for Port Elizabeth Harbour, capable of handling ships up to 1,200 tons. The work has involved the fabrication of thirteen carriages of structural steel, each approximately 50 feet long by 36 feet wide. These carriages are all supported on wheels running on four heavy tracks and are connected together by means of links cut out of 8-in. by 4-in. bars of steel. At the front of this train of carriages is a special haulage track supporting a sheathe of 7-ft. diameter, around which passes the haulage rope. This slipway is believed to be the largest so far constructed in South Africa. The work was carried out by Messrs. Couzin and Attwood (Pty.), Ltd., as sub-contractors to Messrs. Ash Brothers (Pty.), Ltd., who were the main contractors to the South African Railways and Harbour Administration.

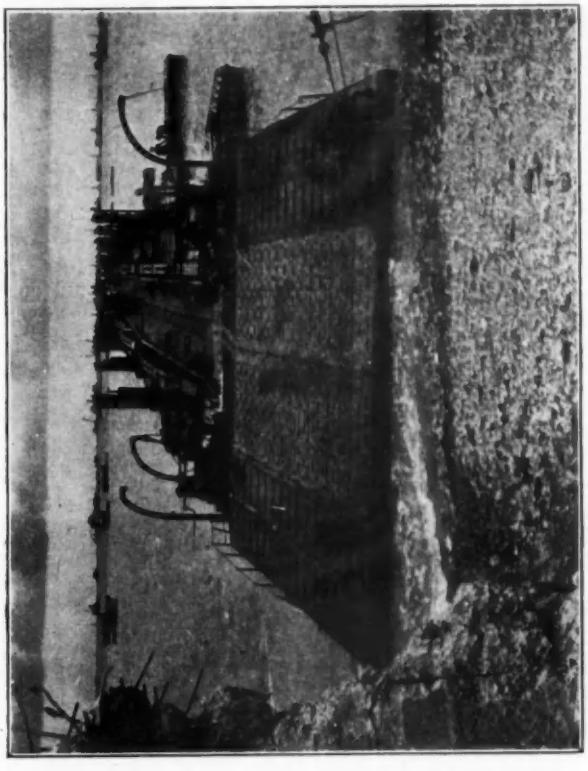
# *The Invasion Harbour of Arromanches*

## *Details of Pre-Fabricated Structures*

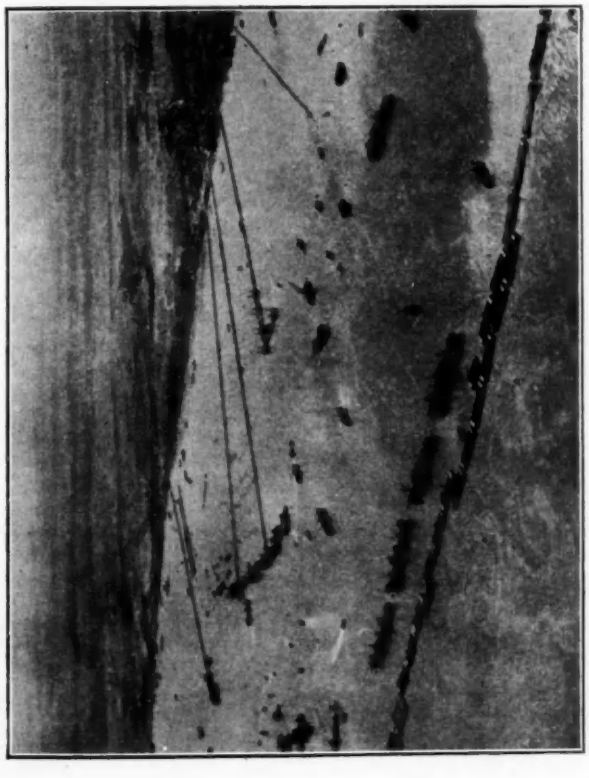
(For description, see p. 161, November issue).



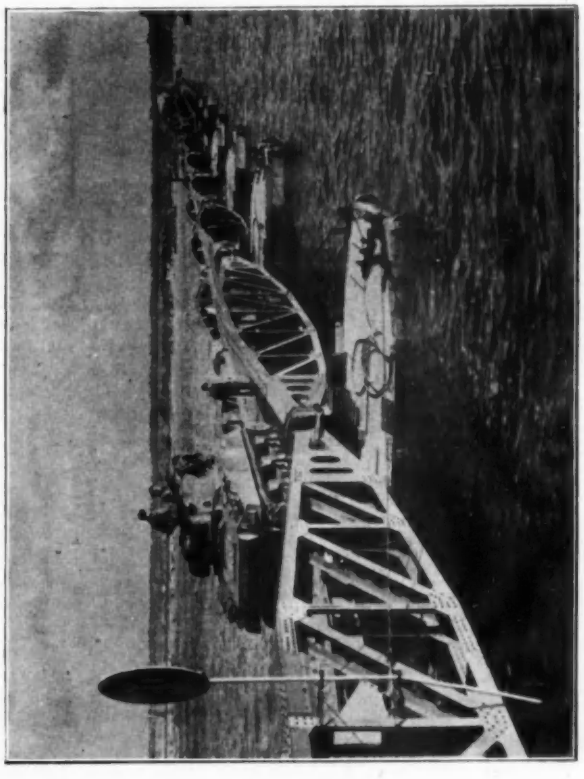
Breakwater Caissons.



Landward End of Pier.



General View.



View of Pier.

# *Legal Notes*

## *Stevedoring Mishap: Lack of Lifeline*

Two cases of unfortunate accidents to docks due to falling into the unprotected holds of vessels on the course of cargo handling operations were heard recently at Liverpool Assizes. We are indebted to *Lloyd's List* for the reports set out below.

In the first case, a dock labourer named John Aloysius Mahoney, the plaintiff, was represented by Mr. A. D. Pappworth, while Mr. W. Clothier, K.C., appeared for the defendants, Messrs. A. E. Smith & Son, Ltd., stevedores, Liverpool.

**Mr. Pappworth** said the plaintiff was claiming damages for personal injuries arising out of an accident in the hold of the steamer *Empire Envoy* on September 28th, 1943, at Birkenhead, when he was employed by the defendants. As he was stacking cases he lost his balance and fell a distance of 20-ft. on to drums of caustic soda which were on the floor of the hold. It was contended that the accident would not have happened if there had been a lifeline along the line of cases, and that a proper system of work would involve the use of a lifeline. It was alleged that during the work a request was made for the lifeline, but one was not fitted. Apparently the job was being rushed and precautions were not taken The plaintiff had sustained fractures of the spine and of both feet.

Giving evidence, Mahoney said he was 27 and had been working at the docks since he was 18. He contended that the provision of a lifeline in such circumstances was general practice on the docks and explained that he fell as he turned a case round. If there had been a lifeline he would have had a reasonable chance to save himself. He did not agree that there was plenty of rope about or that he had been careless. Once or twice he had worked without a lifeline being fixed in position. At the time of the accident the stacking had reached nearly up to the height of the coamings.

John Brandon, who has had 23 years' experience of the docks, said he was also working in the hold of the *Empire Envoy* from 8 o'clock in the morning until the accident occurred. He protested about the absence of a lifeline to the hatchman. It was usual to have a lifeline and one could have been fixed from one side of the ship to the other. A lifeline would have either prevented the plaintiff falling or have broken his fall.

Francis Agnew, a trade union official and a former dock worker, said there was no difficulty in fitting up a lifeline. He had worked with a lifeline on hundreds of occasions and had found that lifelines prevented men falling. He did not agree that a lifeline was dangerous.

For the defendants, **Mr. W. Clothier, K.C.,** said that athough lifelines were mentioned in the regulations there was no provision for a lifeline in the circumstances such as in that case. He contended that a lifeline would have been dangerous and would not have prevented the plaintiff falling.

David Skinner, the hatch foreman, said no complaint was made to him about the absence of a lifeline, and if the men had asked for a lifeline they would certainly have got it. He did not often use a lifeline in lower holds.

Albert Edward Boult, superintendent stevedore for the defendants, said it would have been unsafe to have used a lifeline. The sling would have been over any such lifeline, and that would have been undesirable owing to its danger.

Joseph Marles, the hatchman, said there would have been a danger of the sling fouling a lifeline if one had been used.

William Edwin McMullen, superintendent of the Port of Liverpool Stevedoring Company, said that when men were working on a step in the lower hold a lifeline would be more of a menace, and it was proper to do without a lifeline. In the circumstances of that case in the 'tween decks it was necessary to have a lifeline and it was required by law, but in the hold it was not necessary or usual. He had never heard of it suggested that a lifeline was necessary in the hold.

**Judgment.**

Giving judgment for the plaintiff for £1,000 and costs, **Mr. Justice Lynskey** said he was satisfied that the men complained about the lack of a lifeline and in his opinion there ought to have been a lifeline. The work was dangerous, and any careful firm would have provided a lifeline. There had been a breach of the employers' duty to employ a safe system of work, and if a lifeline had been used in all probability the accident would have been prevented. The injuries to the plaintiff were in part caused by the failure to provide a safe system of work and to fix a lifeline. The plaintiff has sustained a serious injury, was permantly incapacitated and would never again be fit for the full work of a dock labourer.

In the second case, Joseph Donald McDonald, a docker, sued the Silver Line, Ltd., owners of the motor ship *Silversandal*, and Liver Transport, Ltd., Stevedores, of Liverpool, claiming damages for personal injuries sustained through falling through an open hatch of the vessel.

**Mr. Wooll,** for the plaintiff, said that on October 16th, 1943, the plaintiff fell through the open hatch of the motorship *Silversandal*, then berthed in the Queen's Dock, Liverpool, a distance of 40-ft. McDonald was employed by Liver Transport, Ltd., who had just started to load the steamer. The hatch covers of the top section of the hold were removed and the order was given to move the plug hatches from the insulated hold below. The plaintiff went down the only ladder then exposed, but when he reached the bottom of the ladder, instead of finding a firm footing, there was no footing at all and he shot through a gap which had been left open in the cover of the lower hold.

When plaintiff stepped off the ladder he stepped into nothing and he had no chance of saving himself. He sustained serious injuries, including a bad laceration of the brain and a fracture of the right forearm. McDonald was 32 years of age and was at one time graded first class for the Army, but on his re-examination was placed in Grade 4. The plaintiff's claim against Silver Line, Ltd., was based upon the shipowners' alleged failure to comply with certain of the dock regulations and there was an alleged breach of duty against Liver Transport, Ltd. Certain dock regulations were relied upon and complaint was made of failure to provide a safe place and a safe system of work.

**Mr. Clothier,** for the defendants, said the plaintiff decided to go down below without waiting for the ordinary cluster of lights to be put in position and went down into semi-darkness. There was an obligation on him to go below with extreme care, and he ought to have taken far more care than he did. The effective cause of the accident counsel submitted, was the plaintiff's own negligence, and he probably went down in a hurry because it was a dirty night. As the defendants were in process of preparing the hatch there was no obligation to have a cover on. Mr. Clothier contended that there had been no breach of the regulations.

William Bruder, hatch foreman, said he went down to arrange the lights in the 'tween deck and there was sufficient light for him to see where he was going. Witness expected the gang to wait for orders. The ship had just come from dry dock.

**Judgment.**

**Mr. Justice Lynskey** gave judgment for the plaintiff for £932 and costs against both defendants, and granted a stay of execution as to £832. His Lordship held that the plaintiff had received a direct order to go down below and that the lighting was sufficient for a man to go down the ladder with reasonable safety. There had been no breach of the lighting regulations.

If the shipowner had made a reasonable inspection he would have seen that there was a plug hatch out immediately at the bottom of the ladder, and that means of access constituted a trap. There had been a breach by the shipowner of his duty as an invitor to the plaintiff as an invitee. Any inspection by the stevedores would have shown that the means of access to the 'tween deck hatch cover was an unsafe means, and there was a duty to make those means of access safe or at least to have warned the employees. The degree of negligence on the part of the plaintiff was not sufficient to amount to contributory negligence, and the dominant cause of the accident was the breach of the regulations and a breach of common law duty.

**Development of Ayrshire Harbours.**

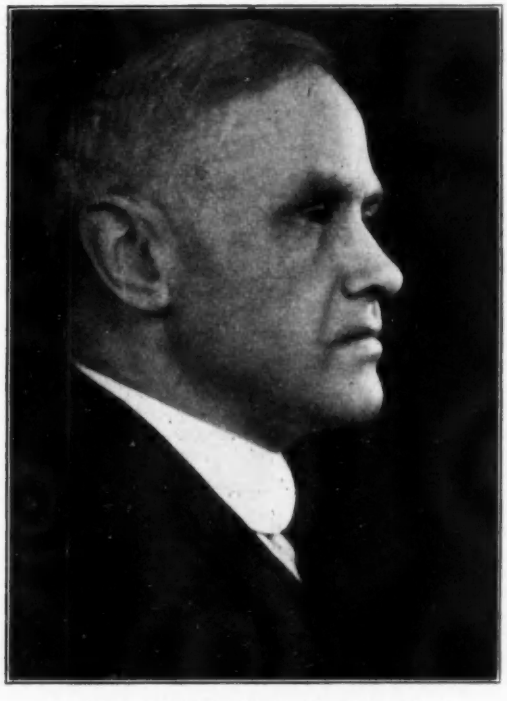
The Ayr County Council have invited the harbour authorities of Ayrshire and other interested bodies to express their views and give information in support of a representation that the harbours of Ayrshire should be developed so as to relieve shipping congestion on the Clyde.

# *The Future of British Ports*

## *Presidential Address of Mr. F. E. Wentworth-Sheilds, O.B.E., to the Institution of Civil Engineers**

I AM indeed most grateful to the members of The Institution for the great honour they have conferred upon me in electing me to be their eightieth President. I am very conscious that I take office at a time when engineers, although little is said about them, are playing a most important part in winning the war, and must prepare to play an equally important in winning the peace. As a consequence our Institution has been, and will be, called upon to give advice and help in many directions, and I know that the Council have had and will have the loyal support of every member in assisting our country to regain the freedom of the world.

I have spent a large part of my life as a Dock Engineer, and I should like therefore to speak to you about British ports—I cannot, at present, say much about recent events at our ports, although some very interesting things have happened, and I am therefore going to be bold and say something about what may happen to them in the future. And first, I should like to congratulate The Institution on the recent formation of a Maritime Engineering Division, as I feel very sure that its work will be of national and international interest and value. Its members, more than those of any other Division, perhaps, will be scattered far and wide, and they will need to devise means for their closer re-union. In so doing they will greatly benefit both The Institution and our ports.



Mr. F. E. WENTWORTH-SHEILDS, O.B.E.

### The Future of British Ports

*Shipping after the War*: Any attempt to forecast the magnitude and nature of the development of British ports after the war is over, at once raises the question as to what extent the foreign trade of Great Britain will increase or diminish in comparison with the years between the two wars. To forecast any definite answer to this question would be absurd, but there seem to be several things which point to the probability that foreign trade will, after a while, revive and grow, and that shipping and accommodation for shipping will be needed in future as much or more than in the past.

To begin with there is no doubt that the Government and an influential section of the British people are impressed with the great importance to the country of the revival and expansion of our seaborne trade. The Government's " White Paper on Employment Policy," published by the Minister of Reconstruction in May, 1944, begins by saying, " We must continue to import from abroad a large proportion of our foodstuffs and raw materials, and to a greater extent than ever before shall we have to pay for them by the export of our goods and services, for as the result of two world wars, we have had to sacrifice by far the greater part of the foreign investments which we built up over many years when we were the leading creditor country of the world. It will not, therefore, be enough to maintain the volume of our pre-war exports; we shall have to expand them greatly. . . . It is therefore an essential part of the Government's Employment Policy to co-operate actively with other nations, in the first place for the re-establishment of general economic stability after the shocks of war, and next for the progressive expansion of trade." It goes on to say, " While the Government will spare no effort to create in collaboration with other governments conditions favourable to the expansion of our export trade, it is with industry that the responsibility and initiative must rest for making the most of their opportunities to recover their export markets and to find fresh outlets for their products. . During the War British Industry has amply demonstrated its power to improve the technique of its production, and this improvement must continue if we are to solve the problems of post-war years."

Whether and how industry will respond to this appeal is a subject on which much has been thought and said recently, but it is perhaps fair to say that provided we can bring home to our people the importance of reviving and expanding our foreign trade, such revival will take place.

Again, it is reasonable to suppose that the war waged on every continent has greatly stimulated a geographical sense among our people, and that many more of them will be travel-minded than formerly, and that greater facilities will be given to young people to travel as a part of their education.

It is true that on account of the enormous development of flying which the war has stimulated, a considerable proportion of travellers, and even of valuable and perishable cargo, will go by air; but in view of the fact that, for the bulk of our trade, the cost of transport will have to be kept down to the minimum, it seems likely that the steamship and the motor vessel will still hold their own.

Also, it is true that for some years after peace is restored, all our resources will be absorbed in repairing the hideous wreckage which this war has left all over Europe, and that " it will be imperative to continue the shipping and commodity controls of war, so as to ensure that materials are distributed in relation to need and not in relation to capacity to pay." But if and when, as we hope, commercial shipping revives and expands, what will happen to our ports?

### Administration of Ports—Past and Future

One peculiarity about British ports is that there is probably no group of organisations, either in this country or abroad, with such a variety of forms of administration; here we have five such forms all carried on with a fair measure of success.

(1) Administration by the State.—Such ports are few because the British people have an innate aversion to State management of businesses, but the Caledonian and Crinan canals, with their ports, are owned and managed by the Government.

(2) Administration by a Municipality.—Bristol is a conspicuous example.

(3) Administration by a Statutory Trust representing all interested parties.—This is a favourite method. London and Liverpool are the largest of such ports.

(4) Administration by a Railway Company, as at Hull and Southampton.

*Delivered 7th November, 1944, and reproduced by permission.

## *The Future of British Ports—continued*

(5) Administration by a Company for profit, as at Gloucester and Ardrossan.

At many ports—indeed at most—some of these forms of administration are found working in combination. For instance, although the powers of the Port of London Authority are wide, and they own the docks, they do not own all the vast number of wharves which line the Thames banks and which are still private property.

All of these five systems of port government have some virtues and some drawbacks. For instance, State ownership, which was so popular in France and Italy, has the merit that raising capital for a large scheme of construction is comparatively easy, but on the other hand, the Government machine is slow and ponderous. The same remarks apply to a smaller extent to municipal ownership. In many ways the Port Trust is ideal, as the trustees directly represent most of the various interests using the port, and therefore know what is needed, and at the same time are anxious to check extravagance. The success that has been attained by railway administration of ports, however, has proved that it is quite possible to pay attention to and to satisfy the various users of a port without necessarily organising them as a Board of Management. It is often said that a Railway Company regards its ports as feeders to the railway and looks askance at road or waterborne traffic, but this so far as my experience goes, is hardly a fair statement. As regards ownership by a company trading for profit, although in past years many important ports (notably London) have been developed by private enterprise, very few have altogether survived as such, chiefly because, whilst dock development is a costly matter requiring large capital expenditure, the income—fluctuating, as it does, with the state of shipping and of foreign trade—is exceedingly precarious.

What then is likely to be the method of administration of our ports when peace is declared and when trade begins to resume its normal aspect, or, at all events, when the manufacture and transport and war material does not loom so large? There seems no reason to suppose that the Government will continue indefinitely to retain the very close control which they have exercised on British ports during the war, although it has been clearly indicated that such control cannot be relaxed suddenly. On the other hand, it is perhaps doubtful whether port organisation will revert to what it was. Except in the case of railway ports, each was independent of the others, and this involved fierce competition between them, with consequent anxiety on the part of each to entice traffic away from its rivals. In many ways this was all to the good, but the more enterprising ports which were able to raise the necessary capital, sometimes spent large sums on extending and equipping their quays to attract shipping which could have been accommodated as well or better elsewhere, whilst, on the other hand, some ports were not improved or even maintained as well as they should have been.

### Link with Central Planning

Planning is very much in the air just now. The Barlow Report of 1939 stressed the virtues of a Central Planning Authority which should not only examine and criticise local schemes for the redevelopment of congested or blitzed town areas, but also encourage the decentralisation and dispersal of industries and of industrial populations from towns in cases where such upheavals seemed to be of national advantage. Although such an innovation would have seemed to the last generation to be an unwarrantable and grandmotherly interference with the liberty of local government and of the industrialist, the idea has met with the approval of various individuals and associations, including the Council of The Institution, whose Post-War Development Committee have blessed it in no uncertain terms. If and when such a central authority is formed, presumably it will have something to say about the areas to be assigned to our ports and about the cargoes which they are to handle.

During the war our ports have all been under the control of the Ministry of War Transport, and in some ways this has been of great advantage. It has resulted in a quick turn round of ships, and an economical use of man-power and plant, such as could have been obtained in no other way. Of course, the Ministry made use of the excellent local organisations which existed at each port. After the war, it is perhaps unlikely that the Government will retain such complete control; but planning seems to require a Central Authority of some sort. What shall it be? Will the control of ports be passed over to the Central Authority, foreshadowed in the Barlow Commission's Report, or will a special body be appointed to deal with ports or with transport generally, including ports? For instance, we get suggestions for Port Government like that of Dr. J. Hannay Thompson, M.Inst.C.E., Engineer and Superintendent of Granton Harbour, who has given much thought to the subject, and who wants every port or group of ports to be governed by a Trust, somewhat on the Liverpool and London models, that is, representing every organisation interested in its welfare, except perhaps the stockholders—with a grand Central Authority built much on the same lines, which should lay down policy for the local port authorities and find the money for their more expensive schemes if approved. This sort of organisation has many virtues, and appeals strongly to the man with a tidy mind. Unfortunately the Briton rarely has a tidy mind, although he undoubtedly has the genius for compromise.

The Electricity Commissioners and the London Passenger Transport Board are often quoted as instances of bodies numerically very small and with therefore very little direct representation of the interests involved, but none the less able to satisfy the ever-varying demands of a huge clientele, who are always ready to express dissatisfaction if it is aroused. It is perhaps fair to say that the success of such bodies is due to the fine qualities, firstly, of their chairmen, and next, of their chief officials. A small body of this kind might control the ports of Great Britain exceedingly well, provided that they had a wide grasp of the problems which lay before them, and power to solve them. But in any case we shall need local Port Administrations to initiate schemes and to conduct the business of the port, and for these I should not be surprised if the genius for compromise prevails and we continue to rely upon the heterogeneous bodies which, after all, have served us well.

I understand that the whole question of the future of port government is being investigated by the Dock and Harbour Authorities Association, which represents all British ports, including railway ports. It should be able to suggest an excellent scheme.

### Link with Town Planning

Many of our big towns, London and Liverpool for instance, owe their importance and even their existence to the fact that they are situated on an estuary, and are thus natural ports. As such, they deal with the imports and exports of the region of which each of them is a centre. In fulfilling this duty they are constantly attracting a number of industries which find it convenient to be near the port. This means that the Town Planners should earmark land, not only for port extensions, but also for such industries, and in the selection of such land the advice of the port authorities should be sought. It is obvious that the town planning people and the port owners must be in close touch with each other.

Quite recently, the chairman of the Port of London Authority drew attention in *The Times* to the fact that the London County Council's scheme for replanning London proposed to remove wharves and industry for some 8 miles of river frontage, apparently forgetting that the very existence of London was due to the Thames and its industries. It may be that it would be possible to divert those industries, or some of them, to other parts of the river, but obviously the Port Authority should have been consulted. Incidentally it is not necessary to cut off entirely public access to the water in an industrial reach of the river. Things can be so arranged that people can watch the ships being dealt with without interrupting the process, whereby a great deal of pleasure is afforded to the onlookers.

Another matter which calls for liaison between port authorities and town planners is the desirability of housing near the port for men who need to be within call at short notice.

## *The Future of British Ports—continued*

### Link with Roads, Railways, Canals, etc.

Whatever form of port government, central or local, is introduced, it is of first importance that long views should be taken as to the planning and management of ports to ensure economical inland transport. Most ports nowadays may be called upon to collect and send away passengers and cargo by road, rail, air, coaster, or canal, or some of them, and as far as possible any of these modes of access should be available. To do this efficiently not only must the engineer have it in mind when he plans or replans the port, but also he and the management must be in close and friendly touch with the authorities who will control the approaches, to ensure rapid delivery and clearance.

It is by no means certain yet who will control the approaches. In the years between the two wars there were a good many pitched battles between the railway companies and the owners of road transport vehicles, especially of goods vehicles. Gradually, however, they were composing their differences, and a proposal to place the management and finance of all forms of inland transport under one authority met with a good deal of opposition, especially from the railway companies themselves, who, it must be admitted, have done magnificent and most useful work both before and during the war, under a directorate elected by the shareholders alone. I think it may be fairly claimed that this is largely due to the fact that the railway companies have fortunately been managed by directors and officials who took long views, and considered that they were best serving the interests of their shareholders by serving the interests of their clients and of their employees. The problem of unifying the management of roads and railways is complicated by the fact that whereas the railway companies own and maintain their own tracks, the tracks used by their rivals are owned and maintained by public authorities. Another complication is that whereas the railways are owned by five companies, the public passenger vehicles are owned by many more, and the goods vehicles by hundreds. For these reasons the problem will, no doubt, taken a little time to solve. Whatever happens, it seems unlikely that the railways or other transport organisations will be nationalised in the sense of being owned and managed by the State.

### Finance

As I have said, ports are by no means easy to finance, because, whilst the capital works involved in them are costly, the income is precarious and liable to vary within wide limits with the fluctuations in trade. And even if, as we all hope and expect, the Government devise means to stabilise trade and employment, such means will doubtless involve the occasional transfer of trade from one region to another, and of shipping from one port to another. If so, it would seem best that the cost of future capital works on ports should be borne by a Central Authority. Again, the White Paper on Employment Policy states that the Government will take action to stimulate modernisation of capital equipment, for example, the improvement of communications, including docks and harbours. If this means that the Government will contribute to the cost of port works, they will doubtless need to be advised by the Central Authority as to which ports need assistance, and to what extent; and again it would seem sensible that the Central Authority should control such expenditure. On the other hand, in the interests of economical work, it would seem well that the collection of dues, etc., and the payment of working and maintenance expenditure should continue to be under local control, as it always has been at most ports, in order that there may be every inducement to avoid slackness and extravagance.

The " White Paper on Employment Policy " suggests that at times when financial depression is threatened, the Government should give financial aid to public works in order to increase the purchasing power of the wage-earners at times when it would otherwise be low. This sounds good, but apparently the idea does not meet with universal approval. For instance, Sir William Beveridge, in a rather severe criticism of the White Paper, condemned this policy on the ground—to put it shortly—that it was not practicable and that it would be unnecessary if production was properly planned.

### Lay-out of Ports

Whether or not our ports are placed under the control of some central authority, it seems right that schemes for their improvement should come from the local managements, who understand the needs and the possibilities of their own ports. I propose later to outline the suggestions for post-war works put forward by one or two of our largest dock authorities, from which it may be gathered that it is likely that when hostilities cease, and when finance can be arranged, such authorities will be ready and willing to carry out important engineering works, not so much in the way of increasing their berth or dry dock accommodation, as in remodelling what they have, so as to reduce delays and encourage rapid and efficient transfer from ship to shore, and from shore to destination, and vice versa.

### Equipment

As I have already remarked, the organisation of our ports has encouraged the rivalry that naturally exists between them. In time past competition has been regarded as the mainspring of industry, but we are now coming to recognise its limitations. Fortunately the rivalry among engineers has always been a friendly one, and ever since The Institution was founded in 1818 and, indeed, since its still very lively predecessor, the Smeatonian Society was founded in 1771, engineers have made it a point of honour and pleasure to help their brethren by freely giving the results of their experience. But there is ample room for much more of this sort of co-operation among engineers, and indeed among port officials generally, and with this remark I am sure that the Dock and Harbour Authorities Association, which has done much to induce these rivals to pull together, will agree.

For instance, although standardisation is to some people a bogey which spells death to progress, it seems absurd that at British ports there should be electric cranes with motors of many different voltages, and running on tracks of gauge varying from 4-ft. 8½-in. to 26-ft. Again a standard dredger designed to deal with varying materials, and with very shallow draught, so that it could work at most states of tide, would be a great boon to small ports and might be purchased by the Central Authority and hired out as required.

### Design and Research

Another matter which calls for the attention of port engineers is the design of new port works, particularly in the way of lay-out, and of the shape and material of quay walls and other dock structures, with a view to securing constructions more rapidly built and less expensive than we have had hitherto. As regard lay-out, I hope they will not rest until they have organised a station for the installation and study of models, which station shall be available at cost for any harbour, dock, or river authority, which needs it. What we require is a station on the lines of the United States Waterways Experiment Station at Vicksburg, Mississippi. This station was started by the United States Army in 1928, primarily for the study of improvements of the Mississippi and its tributaries, with a view to mitigating the disastrous floods which occurred there at intervals. The usefulness of this establishment was soon extended, however, and it is now devoted to analysis by experiment of all kinds of problems arising from the Army Engineers' Department's work in improving American rivers and harbours. A Soil Mechanics Laboratory was added in 1932, and the station undertakes experimental researches on the alignment and strength of breakwaters, the improvement of river and estuarine channels for navigation and for flood prevention, the estimation of seepage losses, through earth dams, the bearing power and compaction of soils, the prevention of slips, and many kindred problems. One could hardly exaggerate the usefulness of such a station to the Harbour and River Catchment Boards of our country, and also to the authorities, whoever they may be, who will be interested in coast protection, a branch of Engineering which has been sadly neglected here because it has been nobody's business.

A very interesting and important example of the help which can be given to the harbour engineer by a well-equipped Maritime Experiment Station is the breakwater at Leith recently carried out by Mr. J. D. Easton, M.Inst.C.E., who rejected the time-honoured

## *The Future of British Ports—continued*

breakwater of " massive " materials such as stone and concrete in favour of one made of clay and sand, protected only with light paving of small stone pitching. Of course such a thing would be impossible but for a careful and elaborate study of both the alignment and the profile of the breakwater, which study was carried out at the Netherlands Government Hydraulic Laboratory at Delft. No doubt the decision to make use of this laboratory was a wise one, as our friends there have had unique experience in the construction of large sea works with soft materials, which experience, I gather from Mr. Easton, they placed at his disposal with their invariable courtesy and goodwill. But I hope that we shall soon be in a position to make such studies at a laboratory of our own.

Another similar problem which a Maritime Experiment Station could help to solve, is the best means of protection against coast erosion, both in the matter of lay-out, and in the detailed construction of sea walls and groynes. I am inclined to think that such researches would teach us that the best coast protection is afforded by sea walls with a curved slope and groynes of the hog-back type, which have proved so successful in Holland.

Moreover, there are several small estuarine harbours along our coasts, the existence of which is threatened by the tendency of the sea to choke them with shingle. Our coasting and fishing trades have always been of great importance to us, and their importance seems likely to increase. Hence the problem of the maintenance of these small harbours calls for economical solution, and this problem would be greatly assisted by model study carried out quickly and at moderate cost.

In advocating a central experiment station for the study of maritime models, I am not forgetting the very fine work which has been done at the Universities of London, Liverpool and Manchester, and elsewhere, nor am I suggesting that these laboratories should be by-passed. But it would seem that so much more of this kind of work remains to be done that all are needed, and also that a Central Station with plenty of space for testing several models at a time is called for. The war has impressed upon us all the immense value of research work in engineering. It has also made us realise that there is not necessarily a serious time lag between the initiation of a piece of work and the production of results, so that we need not shirk research on that account; and further, that research can be usefully applied not only to the materials of construction, but also to its methods.

The very fine experiments carried out in the wave tanks at the Imperial College of Science in London by Brigadier R. A. Bagnold, O.B.E., R.E., and Dr. White, who may be said to have solved by means of models the problem of ascertaining the magnitude of the blow delivered by a wave of known height on a sea wall, suggests that much further useful work in this direction remains to be done. Again a research station devoted to maritime work might well investigate the possibility of building a type of retaining wall which would be cheaper and could be erected more rapidly than those which have hitherto been the favourites.

Consider, for instance, the wall built of interlocking steel sheet-piling. The possibilities of this material have by no means been thoroughly probed. It has all the many advantages of a prefabricated article, in that it can be easily transported from factory to site, and easily and quickly erected and driven. Its bending strength in proportion to its weight or area, is extraordinarily high, and whilst it has great power of penetration its disturbance of the ground below dock bottom, and consequent reduction of resistance of that ground to forward movement, is less than in any other type of wall construction. A well considered scheme of research might develop methods of using this material which would further increase its reputation for speedy and economical construction. Steel sheet-piling has been often shirked from fear of rapid corrosion. Here again research may well show us a way of prolonging its life; for instance, by coating with tar, which our own Sea Action Committee found to give surprisingly good results. A large number of retaining walls of medium height have been built with interlocking steel piling with a row of ties secured to anchors at or near the top of the wall. Considerable economy might be effected in some cases by providing anchor ties at two levels instead of only one.

We have read recently of a very interesting use made of this material by our American friends who adopted it for the walls of two very large dry docks, intended for the construction of fighting ships. The larger of the two docks was 51-ft. high from quay to floor, and the site consisted mostly of a very weak marl. Each wall was formed of two rows of interlocking steel sheet-piling the distance apart of which was less than the height of the wall. The two rows were connected by numerous bulkheads of the same piling, thus forming a series of cells, which were stabilised by filling them with the weak marl which had to be excavated between the walls to allow the dock floor to be built. These cells of steel piling proved sufficiently strong to resist the internal bursting pressure of the wet marl inside them. But the whole wall began to move forward when an attempt was made to fill in behind it with the same unfavourable material. Eventually, however, the wall was stabilised by drying out the wet marl by means of a perforated tube driven into the centre of each cell, and from which the water was pumped out. The drying process was aided by driving round the central drainage tube a number of so-called sand piles which consisted of steel tubes with loose shoes driven through the wet marl, thus forcing the water into the drainage tube. The steel tubes were withdrawn after driving having first filled them with coarse gravel. This method of stabilising the marl was suggested by Dr. Karl von Terzaghi, M.Inst.C.E.

The recent researches in Soil Mechanics have been a godsend to port engineers, particularly in solving their problems of heavy foundations and retaining walls. We are very grateful to the Building Research Station for the work that they have done, not only in the investigation of various problems, but also in the practical training of young engineers in methods of applying the principles of Soil Mechanics, and otherwise making them known. We hope that they will carry on and extend this work and that other engineering schools will also preach and practice this fine aid to economical design.

### Post-Graduate Training

The dock and harbour engineers of The Institution pay tribute to the very good work done by Professor C. E. Inglis and the Education Committee in the remodelling of the examination syllabus, and in the establishment of a Higher National Certificate in Civil Engineering. It is to be hoped that this will lead to a closer and more lifelong contact between the practising engineer and the universities and technical schools. Indeed, I should like The Institution to set a pace for post-graduate work in such schools by awarding diplomas in special engineering subjects, for instance, in Maritime Engineering, which would include Soil Mechanics; the design of breakwaters, quay walls, dry docks, jetties, and dock gates; the principles underlying the improvement and maintenance of river channels and foreshores; and the efficiency of dredging and other similar machinery. Such diplomas might induce the engineering schools to organise more lectures by experts, to be given not only to students but also to practising engineers. Many schools have been in the habit of arranging such lectures, but the attendance has not always been worthy of the occasion.

Also further liaison between engineer and school would result from promotion of research work at technical colleges in such subjects as concrete and soil mechanics. This would admit of local problems being solved without having to send staff and samples long distances to carry out simple experiments.

We gather from the White Paper on Employment that the Government intend when circumstances call for it, to transfer men from one industry to another after giving them the necessary training. This would seem to involve special short courses in the theory and practice of the new subject. No doubt The Institution will be asked to assist in devising such courses as regards civil engineering work, and for organising them our technical schools will be invaluable.

### Relations with Clients, Contractors, Operatives, Etc.

The engineer's task is to conceive a structure which will fulfil a certain purpose, and to get it built. This brings him into contact with various people, who have to share this burden, of whom

## *The Future of British Ports—continued*

the most important are perhaps the clients, the technical assistants, the contractors and sub-contractors, the workmen, the people who will have to operate the structure when he has completed it, and last, but perhaps not least, those who will benefit or suffer by its use. It is perhaps true to say that the engineer has to understand the point of view of each of these interested parties, and also (an even more difficult task) he has to make them understand his own. Any of them (except perhaps the client) may or may not be under his orders, but whether or not, it is of the greatest importance to the success of the work that he should have the co-operation and goodwill of them all.

This, of course, is to say that an engineer's work involves not only the very interesting technique which he learns in the schools and on the works, but also the equally interesting human relations which hitherto he has learnt more or less by trial and error. But the drastic and world-wide changes of which the two great wars have been an outcome, are bringing home to us the supreme importance of human relations, and to-day we are paying far more attention to them than we did. The Institution has helped to widen our understanding of them by bringing men who had made them a special study to come and talk to us about them, and port engineers, among others, will recall with the greatest pleasure having heard or read Dr. C. S. Myers' James Forrest " lecture on Psychology as applied to Engineering " in 1942[1] and also the views expressed at the Conference on Civil Engineers and the Building Industry in 1942-43.

As regards the engineer's relations with contractors, it was remarked at the Building Conference that the risks undertaken by civil engineering contractors are far greater than those undertaken by building contractors, owing chiefly to the impossibility of foreseeing all the troubles connected with excavation in difficult ground—a trouble which is very familiar to port engineers. The Institution and the Federation of Civil Engineering Contractors have recently been engaged on a new set of Standard Conditions of Contract, and have endeavoured to define in what circumstances, and to what extent, the contractor should be relieved of the cost of such unforeseen troubles. It is good to record that the Conferences have illustrated the friendly spirit which exists between engineers and contractors in spite of the fact that their views as to the valuation of contract work must often differ. The same friendly spirit has pervaded the negotiations which framed the rules under which The Institution now recognises service with a contractor as practical training leading to Associate Membership. This recognition is long overdue. It will undoubtedly increase the number of members who practice as contractors or contractors' agents and engineers, and such increase will be of great advantage to all concerned.

It is interesting to note that at the Conference, although one or two speakers connected with Trades Unions decried competitive tendering, the contractors themselves showed no fear of the system, and it seems likely that at least in work like dock engineering, which appeals strongly to the imagination and resourcefulness of contractors, competiive tendering is likely to prevail again when the war is over and when the supply of men, materials and plant is less restricted.

As regards relations with workmen, I think it is fair to say that in comparison with others the building and civil engineering industries stand high in their record of good relations between masters and men, and this in spite of the facts that the rates of pay have been but moderate, the hours fairly long, and the fluctuations in employment higher perhaps than in other trades. This has, no doubt, been due to several causes. For one thing, the work though heavy and sometimes monotonous, appeals to the worker's imagination, because he can see what he is helping to produce and that it is something useful. Moreover, the scene of the work and the nature of the work are constantly being changed, so that the worker suffers less from boredom (which is a very terrible complaint) than many other industrialists. And perhaps more important still, public works contractors and civil engineers who employ workmen have a reputation for being friendly with their men. I have pleasant recollections of many contractors of my young days, who knew personally most of the men they employed, and who financed the Navvy Mission, whose excellent padres were real friends of the workers and their families. As a result of this spirit of friendliness, relations between masters and men are good, and relations between employers' and operatives' federations are also good. Disputes about wages and conditions of work have been amicably settled, and many valuable concessions, such as holidays with pay have been agreed to.

One of the most difficult problems in dockland is how to minimise the bad effects of casual employment. Ships cannot be worked to an exact time table, and when they do arrive they must be discharged and reloaded with the least possible delay. Before the war this was accomplished by keeping at every port a large reserve of labourers, many of whom were idle, sometimes for weeks at a time, and therefore suffered the discomforts, and worse still, the deterioration which unemployment brings in its train. A good attempt to solve the problem has been made by the Ministry of War Transport. Briefly they have insisted that all employers of dock labour should employ either their own permanent men or else men supplied by an organisation set up for the purpose, and known as the National Dock Labour Corporation. This body employs all the casual men, who attend at certain stations eleven times a week to find out if they are needed, and if they are not needed receive " attendance money." If their services are required at another port, they are liable to be transferred to that port. The employer refunds to the National Dock Labour Corporation the wages of the men he employs, plus a percentage to cover the attendance money paid to the men who are not needed. This system to a large extent does away with the former uncertainty of employment, and although some employers would like to see an end to bureaucratic control and form filling, it is generally agreed that decasualisation has great advantages to both men and masters, and it seems probable that it some form it will continue.

But we cannot rest content with what has been done in this direction. We want the life of every man connected with us to be full and free, not only because he will thus best advance the great undertakings which are our own objective, but also because it is his proper destiny, and because we feel that it is our business to help him to realise it.

For this reason we shall spare no effort to bring it about that every one of our men shall have:

1. Continuity of employment amid healthy and attractive surroundings, with its due seasoning of leisure and discipline.
2. An education on such liberal lines that his mind is alive and that he continues to learn throughout his life.
3. Opportunities to understand what purpose the work on which he is engaged is intended to fulfil.
4. A chance of promotion to whatever responsible work he becomes fit for.
5. A sense that his chief is his friend and ready to help him at all times and in all circumstances.

### The Motive Power

I began this Address by pointing out that the revival and expansion of British ports depended upon the revival and expansion of foreign trade, and that the responsibility for such revival and expansion lay upon industry itself. This means that the responsibility must be shouldered by every manufacturing and trading concern; not only by the heads of the concern, but also by every employee from top to bottom. This makes us ask, " Where will the men and women who take part in industry find the necessary motive power to induce each one to contribute his or her share to its revival and expansion? " My distinguished predecessor, Dr. Anderson, had some very cogent things to say about this in his thoughtful Address to us a year ago,[1] from which we gathered that it is largely a religious and psychological problem. To some people this is tantamount to saying that we can do nothing to solve it; but surely this is a mistake. We never allow our-

[1]Journal Inst. C.E., vol. 17 (1941-42), p. 295 (Feb., 1942).

[1]Journal Inst. C.E., vol. 21 (1943-44), p. 1 (November, 1944).

## *The Future of British Ports—continued*

selves to say that our engineering problems are insoluble, until we have thought of all the forces we can bring to bear, and have tried them out to see how they can be best applied. That is Research. What are the forces which stimulate men and women in industry?. We used to think that the most important force was the profit motive, but we now realise that the desire to exercise such attractive qualities as usefulness, efficiency, inventiveness, skill, and friendly co-operation, are also important motives—perhaps more important than the profit motive. How can these motives be aroused, and how can they be applied? Several firms and individuals have been engaged on this piece of research. Take for instance the scheme of training schools set up by Messrs. Newton Chambers & Co., Ltd., of Sheffield, a most interesting account of which appeared recently in *The Times*. The scheme has been initiated by the Managing Director, Mr. H. E. G. West, who has based his methods on Boy Scout experience.

We were told that the objects of the scheme were to give boys and girls entering industry a full and fair chance of becoming useful citizens; to inspire them to effort and personal achievement; to inculcate a team spirit and sense of mutual dependence; to impress them with the dignity of vocation; and to instil a respect for the traditions of a company which has employed five generations of their ancestors, and has won an honourable name in industry and commerce.

The works college prepares for service in commerce, engineering, mining, welding and foundry practice. The physical training is related to the vocation adopted by the youth. The prevailing appeal is to his imagination. In the mining school are photographs of men at work illustrating jobs and lines of promotion. By mural decoration his mind is directed to the wider world, and to the part played in it by the product of his labour. This appeal is bearing fruit. A correspondent who knows them says "I must say there is a vast difference between the boys who have gone through this course of training and those who have not."

Surely this experiment has gone a long way towards solving the problem of finding motive power for men and women in industry. Such a training would not, of course, be so easily given to employees like dock labourers or navvies, whose employment must fluctuate, and whose work is perhaps not so highly skilled. But engineers are very averse to admitting anything to be impossible, and when once we are convinced of the urgency of the problem, I am sure that we shall solve it. If we can solve it, there is undoubtedly a grand future in store for British industry and British ports.

### The New President

A biographical sketch of Mr. F. E. Wentworth-Sheilds was given in our issue of January, 1942. The following is a brief summary:—

Educated at St. Paul's School; 1906-07, Resident Engineer, Isna Barrage, Egypt; 1907-12, Engineer, Ocean and Trafalgar Docks, Southampton; 1909-36, Docks Engineer, to L.S.W. Railway and then to the Southern Railway; 1919-20, went to India to report on lay-out for King George V Dock, Calcutta; from 1927 was Engineer to Southern Railway's elaborate dock extensions at Southampton, including the construction of King George V Graving Dock which was opened by His late Majesty King George V on 26th July, 1933, and can take ships like the *Queen Mary*.

### Traffic at Port of Glasgow.

Mr. T. Macpherson, Regional Port Director for Scotland, has reported an increase in recent commercial exports from the Clyde ports. Traffic-handling facilities on the river have been increased during the war by the installation of new cranes and of additional dock equipment and transit sheds, and in the months before D-Day the labour force was expanded by some 25 per cent. Following a lull in work at the docks after D-Day, states Mr. Macpherson, conditions were now much busier, and a feature was the volume of export traffic. In this connection it was worthy of note that about 50 per cent. of such traffic was for commercial account.

## *Free Ports in Mexico*

### *Establishment of New Customs—Exempt Areas*

The following account of new free-port areas either established, or about to be established, in Mexico is extracted from *Lloyd's List* of November 3rd.

Two free port areas have now been established in Mexico under the provisions of the Law of September 30th, 1939. They are in the ports of Puerto Mexico and Salina Cruz, the Atlantic and Pacific terminals, respectively, of the railway which crosses the Isthmus of Tehuantepec. Preparations are being made to inaugurate a free port at Topolobampo, the Pacific terminal of the Kansas City, Mexico and Oriente Railway, and an inland free port area is projected at Matias Romero, on the Tehuantepec Railway, about one-third of the way from Salina Cruz to Puerto Mexico.

The port of Salina Cruz consists of an outer harbour ("Nueva Darsena"), protected on the south-east by a breakwater and an inner harbour which is divided into two parts. The western part is the Customs harbour, with graving dock adjoining, and the eastern part is the Free Port. This latter includes a quay provided with cranes, warehouses and railway tracks, and, on the other (north) side of the basin, an area for industrial development. Further east there is another large area available for extensions. On the quay are three warehouses 32 metres in width and 125 metres in length, and there are nine 3-ton electric cranes and other cargo-handling equipment. On the outer, or south, side of the mole a second quay is under construction. This also is provided with railway tracks along the edge, sheds 21 metres in width and having a total area of 6,240 square metres, and three sets of railway tracks between these sheds and the warehouses serving the north quay. The depth of water in both the inner and outer harbours is ten metres at low water.

The free port of Puerto Mexico is situated on the west bank of the Rio Coatzacoalcos. It comprises a quay 1,150 metres long with sheds, a commercial zone, an industrial zone and a fuel storage area. The Customs port adjoins it down the river. The free port quay provides five berths, and there are five warehouses giving a total covered area of 20,000 square metres. The mouth of the river is protected by two breakwaters, and the minimum depth of water is 10 metres. The free port provides all necessary facilities for the loading, discharge and storage of cargo, and supplies of water and fuel will eventually be available. At present, however, there is no water supply to the wharves, although a pipe line is being laid, and there are not yet any facilities for coal or oil bunkering.

## *Publications Received*

**The Handbook** (War-time edition) **of the Institute of Transport** contains particulars of the Institute, its objects and membership, which have previously received notice in these columns and which have been brought up-to-date. It includes an Introductory Note on The Examinations contributed by Mr. G. S. Szlumper, C.B.E., T.D., Past President and Chairman of the Examinations Committee.

The 27th annual number of the **Shipping Register and Shipbuilder** maintains the high standard of former issues of this senior Canadian Maritime Journal. It includes a number of articles by well-known public men in Canada, as well as a long and particularised account of the harbours and waterways of the Dominion. The ports of Toronto and Hamilton are singled out for special mention. It is a voluminous publication of 162 large-size pages, and is issued from 610, St. James Street, Montreal.

**A Plan of Drainage and Irrigation Schemes** on the coast of British Guiana shows the projected treatment of various areas at the mouths of the Essequito, Demerara, Mahaica, Mahaicony, Abary, Berbice and Courantyne Rivers. Constructional works would be spread over a period of 20 years and the estimated cost is about $12,000,000. The aim of the schemes is to afford long wanted security from floods during the heavy wet weather and to provide adequate irrigation at all seasons.

# Early Hydrography in Indian Seas

## An Account of Middle East Maritime Surveys in the Eighteenth and Nineteenth Centuries

By Lt.-Col. J. M. LACEY, M.Inst.C.E.*

*(Concluded from page 143)*

### The Maldive Islands

A survey of the Coral islands which cross the track of Indian trade was strongly urged by Captain Horsburg, Hydrographer to the East India Company, who had already written a paper in 1832 on *Navigable Channels separating the Atolls of the Maldive Islands* (Royal Geographical Society Journal II, p. 72), and Captain Moresby, after completing the Red Sea survey was directed to proceed in the *Benares* with Lieutenant Powell in the *Royal Tiger* to survey the islands. *The Maldives* were then unknown, and Lieutenants Young and Christopher (1) were landed at Mate, the principal island, in June, 1834, in order to acquire a knowledge of the language, customs and resources of the inhabitants. The result of their observations are recorded in *Memoirs of the Inhabitants of the Maldive Islands* (Bombay Geographical Society Journal i, p. 54) and *Vocabulary of the Maldive Language* (Bengal Asiatic Society Journal vi, p. 42). It was found that the Maldivians were a civilised, commercial and seafaring people, who had their own nautical instruments and method of navigation.

Captain Moresby was of considerable assistance to Mr. Darwin in the preparation of his work on *The Structure and Distribution of Coral Reefs*. One section of Darwin's chapter on Atoll's devoted to the Maldive Archipelago, and the great Chagos Bank, consists mainly of information communicated to him by Captain Moresby.

While Moresby went to the Maldives, the *Palinurus* was fitted out for the survey of the South Coast of Arabia, and Captain Haines received the command in October, 1832. The survey was intended to cover 500 miles of the coast, but was discontinued in May, 1837, and Captain Haines was appointed Commissioner for the arrangement of affairs at Aden, with orders to obtain satisfaction from the Sultan for the plunder of a Madras vessel that had been wrecked on the coast. Haines arrived at Aden in command of the East India Company's ten-gun brig *Coot*, and Aden was occupied by the English on 16th January, 1838. Captain Haines was the first Political Resident at Aden and held the post for twelve years. (Correspondence relating to Aden, Parliamentary Paper, 1839). Lieutenant Cruttenden, and Doctor Hulton, the surgeon of the *Palinurus*, visited Sanáa, the capital of Yenim, while the *Palinurus* was surveying Mokha roads in 1836. Lieutenant Cruttenden's account of the town, and the coffee yielding high lands, are given in the Royal Geographical Society's Journal VIII, p. 267. Doctor Hulton was taken ill on the road and died after returning to Mokha.

### The River Indus

An important work of the Indian Navy was the exploration of the river Indus in 1833. Sind at that time was unknown, and the Indus river, except for Nearchus' voyage down the river, with Alexander's army, unexplored. Little was known of the civilisation of the Indus valley which vanished without leaving a single trace, in contrast to the Tigris, Euphrates and the Nile rivers The antiquity (B.C. 2500 to 2100 B.C.) of the Indus cities is now being established, because of their distinctive manufactures, which were exported to Mesopotamia, and the cities are now being excavated.

When General Pottinger went to Sind he was accompanied by Lieutenant Del Hoste of the Indian Navy, who prepared a topographical memoir of the area traversed, with a sketch map (see Bombay Geographical Society Journal i, p. 22). To Lieutenant John Wood, however, belongs the greatest credit of exploring the Indus river and its sources. Wood was born in 1812, was educated at the Perth Academy and joined the Bombay Marine when very young. His work on the Indus river began in 1835 in command of the first steam vessel that navigated the river. Wood made a survey of the river from its mouth to Attock. In 1836 he accompanied Alexander Burns, who was exploring the Indus, in his mission to Kabul. After reaching Kabul, Wood crossed the mountains Kunduz, and was the first European who ever reached the Bami-Dunya or the Roof of the World in 1838, and so the source of the river Oxus. For this discovery Wood received the Gold Medal of the Royal Geographical Society in 1842 (Royal Geographical Society Journal X, p. 520, *Report on the Source of the Oxus*, by Wood).

Southern Coast of Arabia

The survey of the Indus river and its tributaries was completed by Lieutenant Carless in the *Palinurus*; he also surveyed the whole coast line of Sind from the Eastern mouth of the Indus to Sunmiyani in 1837-38 (see Royal Geographical Society Journal VIII, p. 328, " Memoir to accompany the Survey of the Delta of the Indus in 1837, by Lieut. Carless.")

The operations in the Punjab led to the formation of the " Indus Flotilla " in order to ascertain the capabilities of both the Indus and its Punjab tributaries for navigation.

Sir Charles Malcolm retired in 1838, and was succeeded by Captain Oliver, R.N., who had to recall all the surveys on account of the war 1839-44. Surveying operations were confined to the narrowest limits, and all plant, instruments, and the officer's allowances were reduced to minimum requirements. The acquisition of knowledge beyond that necessary for marine surveying was discountenanced. Sir Richard Oliver died at Bombay in 1849, and was succeeded by Captain Lushington, as Commander-in-Chief of the Indian Navy, who did his best to restore the service to the state of efficiency it had attained under Sir Charles Malcolm.

### Mesopotamian Rivers

About the time the " Overland " route was under consideration, a scheme for a shorter journey to India was put forward, viz., from the coast of Palestine and down the Euphrates or the Tigris river to the Persian Gulf. The proposal was so far advanced that shallow draught stern wheel steamers were designed for the navigation of these rivers. It also became necessary to survey these rivers, and to investigate their capabilities for water transport.

*Formerly of the Indian Public Works Department.

## *Early Hydrography in Indian Seas—continued*

The survey of the rivers Euphrates and Tigris, and the region of Mesopotamia comprised in the area traversed by these rivers, is mainly the work of the Indian Navy. During upwards of 26 years, the accomplished and capable officers of the Indian Navy persevered in the survey of these rivers and the neighbouring country, so full of historic associations, in the face of great difficulties and dangers. For this work alone the Indian Navy ranks among the foremost contributors to geographical knowledge,

From 1826 to 1830 Lieutenant Ormsby leaving the Indian Navy, devoted three years to exploring Mesopotamia. His adventures are described in Wellsted's *Travels to the City of the Caliphs* (two volumes, London, 1840). In 1837 Captain Henry Blom Lynch, an accurate and scientific surveyor, and a daring explorer, who commenced his career in the Bombay Marine on the Persian Gulf survey of 1820, traversed the whole course of the river Tigris from its source in Armenia to Bagdad and connected Nineveh, Bagdad, Babylon and Ctesiphon, completing the Tigris map in 1839. (See Royal Geographical Society Journal ix, pp. 441 and 471). In October 1841 he commenced the survey of the Euphrates river with Lieutenant Felix Jones as his second in command, and in the steamers *Netocris, Nimrod* and *Assyria* ascended the river and connected his survey with the Mediterranean Sea. Lynch retired in 1843, and was succeeded by Felix Jones.

Canal at Port of Basra, Iraq

For the work of the survey of Mesopotamia, in addition to those of a surveyor, several other qualifications were necessary for success. Knowledge of the language and of the ancient history of the country; tact and judgment in dealing with the wild Arab tribes and capacity for enduring fatigue and privations. All these attributes were possessed by Felix Jones, who began his career in the Indian Navy on the Red Sea Survey of 1830; later he served on the Maldive Islands Survey, and later reported on the Harbour of Gramel Kuvell in 1832; since which time he had been serving under Lynch on the Euphrates river. He was stationed at Bagdad in command of the steamer *Nitocris*, besides other administrative duties. The country, infested by wild Arab tribes, was frequently dangerous and it was necessary to seize every chance of exploring and surveying. In 1844 Felix Jones, now a captain, accompanied Sir Henry Rawlinson on a journey to collect information regarding the boundaries between Turkey and Persia in a country little known. Felix Jones also determined the course of the ancient Nehrwar Canal, and surveyed the once fertile valley it irrigated, now a desolate waste. From April to September, 1850, he surveyed the old bed of the Tigris; descovered the site of ancient Opis, and made researches into the vicinity of the Median Wall and Physcuc of Xenophon; and in 1852 he surveyed the ruins of Nineveh. He was assisted in his research by Doctor J. M. Hyslop of the Bombay Army, and Mr. T. K. Lynch, Consul-General for Persia.

Felix Jones retired from the Mesopotamia Survey in 1855 and took up the post of Political Resident at Bushire in the Persian Gulf. In the war with Persia, he made excellent arrangements throughout the country for the transport of the commisariat department, which obtained an appreciation of his good work from Earl Canning, the Governor-General (Indian records, Political and Secret). Assisted by Captain Malcolm Green, he made a survey of the " Shalter-el-Arab," and the Karion, which enabled Sir James Outram to attack Muhammerah.

All work on the Mesopotamia survey was stopped in 1862, leaving it incomplete. Felix Jones' heart was in Mesopotamia, where the greater part of his professional life was spent. The last years of his life, after his retirement from active service, were occupied in drawing a detail map of Mesopotamia; his revision for this purpose having been secured by the Secretary of State for India in 1872 (the Crown having taken over the Government of India in 1857). The directors of the Crystal Palace placed an apartment in their edifice for his work. He lived to finish the map which remains in MSS., a monument to his skill as a cartographer. The map consists of four sheets, 25 inches by 39 inches and on a scale 1-930,000. He died at Fern Side in Upper Norward on the 3rd September, 1878. [Proceedings of the Royal Geographical Society —New monthly series, Vol. 1, 1879 (from January) " Obituary, 1878-79," p. 367].

The last but not the least important work of the officers of the Indian Navy was the careful revision of the Persian Gulf survey 1857-1860 by Captain C. G. Constable and Lieutenant Stiff. Constable had taken considerable interest in the maritime geography of the Persian Gulf, and had collected a mass of material with a view to preparing a " Sailing Directions " for the Gulf. A number of omissions and inaccuracies had been discovered in the old survey, and the revision consisted in carefully determining certain fixed positions round the Gulf, and compiling a correct skeleton of the islands, and the principal points round the Gulf, with some details of the coast line round the fixed positions. Lieutenant Stiff, one of the most accomplished of those surveyors who made the Indian Navy famous, eventually became engineer to the Persian Gulf Cable.

Captain Constable's chart of the Persian Gulf was published by the Admiralty, and the hydrographer Admiral Washington sent it to the Great Exhibition of 1862 as a good specimen of English chart drawing.

Surveying was but a small part of the work of the Indian Navy. Its influence extended to the suppression of piracy; extension of commerce; to the maintenance of the status quo of the Arab chiefs; to the exclusion of foreign trade, and to the elimination of the slave trade, particularly in the Persian Gulf. The Navy hunted down the atrocious hordes of pirates along the Arabian coast, and the Red Sea, and thus enabled merchant men to pass up and down in safety.

In his Anniversary Address to the Royal Geographical Society for 1862, Sir Roderick Murchison states:

> " The war services of the Indian Navy, as well as the beneficial, and enduring results of its repression of piracy, and the slave trade, are well known. These services have been varied, honourable and useful, but in the eyes of the geographer the widespread and lasting utility of the excellent surveys made by the officers of the Indian Navy hold an equal prominent place." (Royal Geographical Society Journal, XXXIII, p. cliii).

---

**Corrigendum.**—A misprint has been noted on page 137 of the October issue. In the two formulas towards the end of the article by " Helios," on The Theory of Wave Pressures against Vertical Walls, $6.2_s$ should read 6.28 (twice $\pi$).

**Death of Research Director.**

The science of metallurgy, and particularly that branch of it which is associated with the production of steel, is definitely the poorer for the sudden and untimely decease of Dr. T. Swindon, Director of Research in The United Steel Companies, Ltd. Dr. Swindon was associated with a great number of investigational activities of national and international importance and his contributions to knowledge in the iron and steel industry were of great value.

# *Transport between the Wars*

## *Silver Jubilee of the Institute of Transport*

In celebration of its twenty-fifth anniversary, the Institute of Transport has issued in pamphlet form a paper prepared by **Mr. D. R. Lamb,** one of its members, reciting the beginning and achievements of this latter-day scientific society. The record bears witness to the power of the technical Press, not only in arousing interest in a worthwhile object, but also in setting it in motion, for the author explains how the Institute owes its origin to the enterprise of *Modern Transport* in successfully soliciting the support of the leaders of the industry towards the founding of a society which to-day enjoys Royal Patronage.

It was on August 7th, 1919, that, following publication in its columns of a series of letters advocating an Institute, *Modern Transport* held a luncheon party in London at which was appointed a provisional committee charged with the preparation of a constitution. This committee was fortunate in securing the services of Mr. (later Sir) Herbert Blain, who as Operating Manager of the London Underground Railways, accepted the Honorary Secretaryship, and whose energy and enterprise contributed in no small degree to the success of the movement.

It was a great day in the history of the Institute when on November 16th, 1926, it received full recognition by the grant of a Royal Charter of Incorporation containing the pregnant message:

> " We do reserve to Ourselves to be the first Patron after the granting of this Our Charter."

The Institute still enjoys Royal Patronage.

### Education and Examinations

The drawing up of a comprehensive education and examination scheme was one of the early tasks of the Institute of Transport, undertaken with the object of providing courses of study for the guidance of educational institutions anxious to provide specialised and organised instruction in transport subjects and of setting a standard for attainment by those aiming at becoming Graduates and Associate Members. Having regard to the wide and specialised field of transport economics, administration and operation, many difficulties had to be surmounted. There was no complete or comparable transport education scheme, no comprehensive training facilities or text-books, and few, if any, examiners combining academic qualifications with practical knowledge and experience. Nevertheless, leaders in all branches of transport activity collaborated with university representatives in the initiation of courses of lectures throughout the country, and the assistance of experts was obtained in the preparation of an entirely new series of text-books.

The first transport examinations were held in London, Leeds and Manchester in April, 1926. In April, 1939, they were held in London and seven provincial centres, as well as in the Argentine, Burma, Colombia, India, Kenya, New South Wales and South Africa. Examinations have continued annually throughout the war and correspondence courses have been made available to members in the Forces, including those in prisoner-of-war camps; in many of these camps examinations have been held.

### Presidents

The long and distinguished list of Presidents of the Institute, comprising notable personages associated with all branches of the industry, includes Sir Joseph Broodbank, formerly Chairman of the Dock and Warehouse Committee of the Port of London Authority and Sir David Owen, General Manager of the Authority, both now deceased. Other Presidents connected with port work and shipping are Sir Alfred Read and the present office-holder, Mr. Robert Kelso.

The membership of the Institute, which twenty-five years ago numbered 440, now stands at 5,800 and embraces most of the leading authorities in transport throughout the British Empire and wherever British-owned transport is operated.

### The Silver Jubilee Scholarship

A special scholarship has been founded by the Institute to commemorate its twenty-fifth anniversary, in connection with which the following announcement has been issued:

**1945 Award.** The Council of the Institute of Transport invites applications from members of the Institute for the award in 1945 of the Silver Jubilee Scholarship of value not exceeding £150 tenable for one year.

The purpose of the Scholarship is to assist the selected member to meet expenses to be incurred in (*i*) travel for the purpose of studying transport or (*ii*) specific projects of transport research, or (*iii*) full-time education at a University or other educational institution approved by the Council.

Candidates will be required to indicate the subject they desire to study, the reasons for their choice and how they would propose to utilize the Scholarship for the purpose. Preference is likely to be given to one who has passed the Associate Membership Examination of the Institute and who is not over 30 years of age.

The amount of the Scholarship may be paid to the holder by instalments at such times as may be decided when awarded but fees for tuition will be paid to an educational authority direct.

The holder of a scholarship for travel or research will be required at the expiration of its tenure to make a report to the Council on the work he has carried out. The Council reserves the right to publish the whole or any part of the report.

The Scholarship may be varied or cancelled should the holder cease to pursue his approved scheme of study, travel or research or should his progress be deemed unsatisfactory.

**Applications.** Applications must be made on a form to be obtained from the Secretary, the Institute of Transport, 15, Savoy Street, London, W.C.2, with whom it must be deposited not later than April 30th. Each application must be supported by a Member (M.Inst.T.) of the Institute who, by personal contact, has had the opportunity to form an opinion of the suitability of the applicant.

Applications will be considered by the Awards Committee of the Council of the Institute of Transport. Candidates who are selected for the short list for final consideration will be required to attend, at their own expense, for interview with the Committee (or a Board appointed by it). The Council's decision on all matters relating to the award and administration of the Scholarship shall be final.

# *Hull Port and City Re-planning*

## *Formation of Advisory Committee*

Following the receipt of a report and plans from Professor Abercrombie for the post-war replanning of Hull, the City Council, having discussed the matter, decided on the formation of an industrial advisory committee to consider the plans and their implications. It consists of four members each of the Port Authority, the Chamber of Commerce and Shipping and the Hull Corporation Co-ordinating Committee. The following have been selected to represent the Chamber of Commerce: Mr. William Fenton, president; Mr. L. H. Downs, senior vice-president; Mr. A. R. Cleminson and Mr. W. D. Thomas.

Almost simultaneously, another meeting has taken place between representatives of users of the port and the London and North-Eastern Railway Company, who are proprietors of the dock system. The reconditioning and improvement of the docks, apart from any projected development of the port, are matters of urgent importance to the shipping and mercantile community and the Railway Company are showing a commendable zeal in taking the matter up and conferring with local interests as to their requirements. Prior to the war, there were very extensive trading operations between Hull and Scandinavia, Finland, the Low Countries, France, Italy and the Mediterranean ports generally. Imports consisted largely of timber, and exports, of coal from South Yorkshire, but there was also a large general trade, all of which the city and port of Hull are anxious to see re-established on the pre-war scale, with preparations for a naturally expected increase.

# *Ship Fires in Port*

## *Expert Deductions from Bombay Dock Fire*

At a recent meeting of officers of the National Fire Service in the North-Western Area, the following remarks by a senior officer, who has had considerable experience with ship fires. were reported in the *Journal of Commerce* on November 2nd. They were based on the outbreak on the *Fort Stikine* and the resultant explosion in Bombay Harbour in April last, an account of which was given in our October issue.

" Every fire officer will consider himself very fortunate that the problem and risk of the fire on the *Fort Stikine* did not fall on his shoulders. The report, however, contains many points that should be carefully studied for the reason that the unfortunate occurrence imparts a lesson that could not otherwise be viewed with the same degree of importance.

" The main point is not so much what was done after the discovery of the fire but concerns to a large extent how the fire started, then, to a much greater degree, the practice of loading commercial cargoes in the same compartments as explosives of a high risk nature.

" It is easy to be wise after the event, but surely this accident will be considered the reason for preventing the loading of part-cargoes without careful regard to the cargo already in the holds, and stipulating what should, or should not be stowed; in addition certain recommendations should govern the complete removal to another part of the ship of part-cargoes that are subject to possible chemical reaction with the intended cargo to be taken inboard.

" Reading the report, it would appear that the fire service was not in attendance until 45 minutes after the fire was discovered; if that is true, the action on somebody's part is tragic indeed. It is a great pity that keen, well-meaning and enthusiastic persons, in their own job, will assume that anyone can fight an incipient fire. All fires are small ones before they become big ones, and such persons lose sight of the fact that fighting fires is as highly skilled an occupation as their own, however skilful.

" They cannot possibly have the experience to determine the possibilities of an incipient fire, they are not aware of the fact that a very simple action may alter the course of the ventilation, or that the application of water at a certain point may cause the fire to take a more difficult or dangerous course. It may be for the fire officer to say that no water is to be applied, or cargo shifted until such time as he has decided what course he thinks the fire will take. These decisions often come, as it were, ' in a flash,' but it is not because of their simplicity but more the result of comparative experience.

" It may be that because of the limited number of jets and water volume of the ship's equipment that the action taken before the arrival of the fire service did no more than wet the upper surface of the cotton in the *Fort Stikine*.

" It may also be the case that whilst the heat rise and smoke were showing from a particular quarter, the fire zone may have been some distance away. For example, if there was a volume of smoke and heat rising up the web frames it would not necessarily mean that the fire was near the skin of the ship; by some feature of dunnage assembly, that may have been the easiest course of escape from a deep-seated fire some feet away from the ship's side.

" In consideration of the operation to control the fire it is necessary to refer to several important facts concerning ship management as well. In the matter of moving the vessel, there may be several reasons why a ship cannot be moved from a berth; lack of steam, dismantled engines, different water level between docks in internal systems, and movements, where possible, would mean the cessation of fire control other than by the ship's equipment.

" Whilst it is possible to land trailer pumps on the deck of a ship, it must be understood that the pumps have a maximum ' lift ' of 28-ft. in still water.

" Lifts of 24-ft. are generally understood to be the maximum and, in addition, the deeper the lift the lesser the volume of water delivered. In working from the deck of a ship in a tideway or with a moving ship there would be a drag on the suction hose and a possible vortex, all this even if the permitted freeboard did not exceed the ' lift ' limit.

" In operations covering the flooding of a partly filled hold, the buoyancy of the cargo has to be taken into consideration. If the cargo is well bonded it will lift in the whole, retaining the stowage feature to some extent. This is a most important point; there will be always a certain proportion of the cargo above the water level until the hold is completely filled.

" If one looks at this a little closer, it will be seen that during the latter part of the flooding, the upper cargo will be hard up underneath the deck-heads with intense heat conductivity to the deck above, where rapid flooding is permissible. It does not matter how quickly this period of deck heating takes place, there is only one way it can be countered, and that is by maintaining a water seal on the deck above, if necessary to the depth permitted by the height of the coamings.

" In the operation of playing jets down on to the cargo from the upper deck level, the amount of cooling effected to the hatchway is negligible. If the same volume of water was played down the hatchway from numerous spray branches the heat condition of the effected compartment would be considerably checked, and the water would still play its part in the flooding. By continuing operations in this manner, it has been found that the firemen have been able to get down on top of the cargo at a much earlier stage than would appear possible. It must also be considered that the cargo will lift and lessen the distance between cargo and deck-head, but the main point is that the top surface heat must be controlled as long as possible.

" A point is made in regard to the fire pumps and the water cooling system for the engine. To those not in full knowledge of pump operation, it must be explained that the water in the radiator is cooled by a coiled pipe system, very similar to the condenser system in a ship. The coiled pipes are fed with the water from the pump deliveries, the water then running to waste underneath the pump. This means that there must be a pressure of approximately 20 lbs. to ensure an adequate velocity of water in the pipes, that is to eject the water as soon as it has extracted some heat from the radiator water.

" In rotary pumps, it will be understood that pressure can only be developed by resistance to the flow of water; by the use of open ends this resistance factor would be very low, which could only be countered by fitting a branch or closing one of the delivery outlets to a limited flow.

" Whilst an inquiry has a factor of opportioning blame, the finding should give a clear direction to prevent any further occurrence of this nature. Perhaps the best conclusion we could reach in our verdict would be:—

" If there is a fire on board a ship in port, however small, call the fire brigade at once and make your survey whilst they are answering the call; if the fire is out by the time they arrive they will be just as pleased as you are.

" That the circumstances that permitted this kind of mixed stowage should be reviewed at once and that oil, cotton, timber and explosives should never be stowed in the same compartment, however separated by 'tween decks, hatch covers or tarpaulins.

" In the matter of non-return valves in the bilge lines the introduction of sluice valves which could be operated from the winch deck would be more suitable; it must still be taken into consideration that there are limits to the amount of water that can pass through a pipe irrespective of the pumping capacity and however great the pressure.

" In flooding technique these fires bring to the front the limitation of flooding volumes. In this case the water could be poured into the *Fort Stikine* from the open hatch, but how quickly could a hold be flooded at sea by a ship's fire equipment and when the ship is fully loaded?

" We may yet see bulkheads in the form of cofferdams, spaced to a few inches, and water drencher systems or diffusor nozzles fixed under the deck-heads with a large diameter pipe system from the main pumps rising to the level of the freeboard deck and fitted with valves controlling types to every underdeck compartment. The volume from a 4-in. fire main can, in no sense, be considered as adequate for urgent and rapid flooding."

# *Chains for Hoists and Slings*

## *Care and Maintenance*

By A. G. AREND.

The maintenance of chains has been so much bound-up with fixed rules and regulations in connection with standards and breaking strengths, etc., that comparatively little literature has appeared on the subject, as can be confirmed by a survey of what has been published since the last war period. In the intervening years the wire rope has become increasingly popular, since it is better suited for high-speed lifting purposes, whereas the chain is more or less limited to short distance heavy lifts. As one of the features of most modern enterprise is to speed-up all activities, it is not surprising that the wire rope has outclassed the chain in many respects, but the chain remains unsurpassed for withstanding rigorous and severe service conditions for practically all heavy work. The best conditions of user can only be assured when both periodical rough inspection, and scientific examinations are carried out.

During the last war period, " X "-ray examinations of metals were in their infancy; they have since been raised to the highest standard of efficiency, but are only employed for checking-up or proving certain defects and not for regular investigations.

More attention has been devoted to acoustic and electrical methods of testing, such as is performed with shafts, etc., as the total time occupied is trifling and corresponds more to what would be expected from the testing of individual links. Certain makers of heavy chains number the individual links, but this system is not universal. When a defect has been revealed as a result of investigation, much time is saved in identifying the particular link in question without occupying undue space or necessitating markings, etc. The early adage that " the strength of a chain lies in its weakest link " did not appear to be fully appreciated after the last war period, when more than one instance came to light of overloading in scrap yards, where apparently old chains had been acquired cheaply. Many articles are in demand in scrapped condition, but old chain is perhaps an exception. This is not only because of possible defects, but because as scrap metal it involves much handling, offers practical difficulties in feeding into open-hearth furnaces, except those provided with removable roofs, such as are used where molten iron is charged, and tends to occupy much unnecessary space within the hearth.

The steelmaker does not want the class of metal which will not lie snugly, which increases fuel consumption, and which gives high melting losses. It thus behoves the chain user to inspect and have the chains annealed at regular intervals to ensure maximum service since eventually it will be literally worthless. It is well known that imperfect annealing or normalizing can do more harm to the metal than if it had received no attention at all, but even if perfect treatment has been applied, this should not be repeated more than six times, a small point which is sometimes overlooked.

### Practical Service Examination Methods.

In the severe service expected of slings, the chain can resist wear, rigorous treatment, and corrosion better than wire rope, but the chain breaks suddenly without warning of any kind. The wire rope differs in this respect, since even when severely overloaded, the strands tend to rupture progressively, and not all at once. The noise emitted attracts the attention of the craneman or attendant, usually a few seconds before total disruption takes place, and affords the opportunity to get the load out of the way before injury can be sustained. Inspection is facilitated in that the individual strands break one after the other when the wire rope has become fatigued after strenuous service. Since no such apparent information is available with the chain, when it is in daily use, inspection should be made weekly, particularly where it is engaged on short-haul heavy work. It has to be remembered that in actual practice the chain links may become covered up with clay, dirt, or snow, which adds to the difficulties of the investigator in endeavouring to locate one link which may have been under suspicion. It is here that the serial numbering system is advantageous instead of depending upon markings, as the stamped number can be " felt " for along a lengthy line, and almost instantly isolated for inspection. The study of ultrasonics has been widely developed since the war commenced, and it transpires that small sets of the portable order have already been tested out for rapidly ascertaining defects in other branches of the metal industry, instead of requiring regular laboratory examination. When installing a fresh chain, a safety factor of not less than five is often adhered to, and where inspection and modern testing methods are applied, any diminution as a result of service conditions can be followed with precision. No such system could be followed during the last war period, as at that time the subject of ultrasonics was unknown, and to this remark alternative specialized electrical testing also applies. Apart from the matter of defects appearing in the internal crystalline structure of the metal, wear arises where the adjacent links bear upon each other, at which points attention should be given throughout the entire length of the chain. This wear, when developed to more than 25 per cent. of the original thickness, should prohibit the further use of the chain for hoisting purposes. The approximate breaking strength, when the dimensions of the link-ends have been reduced by degrees until only 75 per cent. of the original thickness has been left, has been tabulated in detail by W. E. Rossnagel for chains used for sling or hoist purposes. Equally important is the testing of the stretch which develops after continued service, and which necessitates annealing, although no other defect may appear; if this is extreme, the chain as a whole should be condemned.

Centre-punch marks are made between definite points at intervals of a fixed number of feet, and should the extent of stretch reach as much as 1 inch in 3 feet, the need for annealing is indicated, whereas beyond this limit, the chain should be discarded. The welds of a manually forged chain depend on the human attention given, and hence inspection necessitates close scrutiny at these points. Apart from definite cracks on the surface of the links, all cuts, deep scratches, sharp nicks, and gouges, can ultimately lead to the development of fissures, while in the second place, they are largely responsible for increasing the wear where the adjacent links bear upon each other, as this tends to introduce a modified grinding action. Links which have been bent out of shape should, of course, be removed from the chain and replaced by fresh ones. One method of detecting a crack which cannot be readily ascertained visually, is to soak the suspected link in oil, remove the surplus of the latter and cover with finely powdered white chalk. What happens is that oil will remain in the very faint crevices if a fissure is present, and after a few hours will discolour the coating at that point alone. This test has been improved upon by the use of selected dyes, but belongs to a more specialized form of testing.

### The Hook

The hoist hook when overloaded has the tip or tongue spread away from the neck, and the sling should have the layout designed so that the hook represents the weakest part, as this spreading action is readily evident and means that the individual links are exposed to less strain.

In view of its shape, it is but rarely that the hook breaks, but it can readily get out of shape, and the opening or spreading of the arc requires to be closely followed.

This is because the extent of deviation determines the extent which it can be further used with impunity, and a slight amount of deformation can be rectified by re-forging and annealing, but not if this extends to cause a full opening out from the neck when there is no alternative but to scrap the hook. It has been claimed that the load on a hook can reach within 300 per cent. of the rated capacity before deformation of a serious order can arise, but the neck has to be inspected to ascertain if there are any suggestions of strain. The use of a template to check the amount of deviation of the arc of hooks has been proposed, but it is doubtful if it was ever put into service, since visual inspection usually suffices. Where the fillets at the shoulders have a small radius, there is more need to inspect the neck of the hook for strains.

### Annealing Chains

The work of annealing is simplified where a reliable chart is available for consulting in respect of periods of heating and temperature ranges. While the black-out was fully in force, hooks

## *Chains for Hoists and Slings—continued*

were sometimes painted white to attract attention, and even luminous paints were proposed to facilitate handling work. As previously remarked, the wire rope gives indications that a rupture is about to arise unlike the chain, and in order to harden the exterior of both links and hook so that these will resist cuts and be less liable to break, researches have been carried out alike with induction hardening, nitriding, and special chrome-coating methods. These do not appear to have received much favour, since, while it is desirable that the two sides of the links be well protected, the same cannot be said of that part where they bear on each other, and once the hardened skin is penetrated it means that one face tends to grind its neighbour unduly. For detailed accounts of the classification of breaks, specification proof loads and actual results obtained, together with the effect of initial and subsequent loading on elongation of the chain, reference should be made to different publications of " The American Society for Testing Materials," and for standards and reports on chains to those of " The American Society of Mechanical Engineers." In this country, details have been issued by " The Board of Trade Regulations " for testing chain cables, etc. On the Continent just prior to the war, a number of improvements appeared to have been made on chain bending machines for handling large makes of links.

Chains for application in hoists and slings have not enjoyed so much attention as improved roller chains and others required for chain-belt or mechanical handling systems, but they remain unsurpassed for short-haul heavy work.

### Conclusion

In conclusion, improvised methods of setting-up chains, lengthening them by bolting together two different sections, or shortening them by looping links, are not to be recommended. Although perhaps functioning at the time, this means that the individual links are exposed to undue bending stresses, which will eventually lead to deformation, whereby the safe working load permissible is correspondingly reduced. Accordingly, the chain should either be used as received, replaced by another of more favourable length, or not used at all, if the best results are desired.

## *Port of Rio de Janeiro*

### *Demand for Improved Facilities*

A number of suggestions for improvement of facilities at the Port of Rio de Janeiro are set out in a memorial to the President of the Republic of Brazil by the Federation of Brazilian Chambers of Commerce. The following are the leading recommendations:—

(1) The building of more warehouses and where possible the addition of a second floor to existing ones.

(2) An increase in the number of dockside cranes, including some of 20 tons.

(3) An increase in the number of locomotives and wagons and of electric platform trucks.

(4) The extension of the quays to be completed and the necessary warehouses provided.

(5) The dock area and channels to be kept permanently dredged.

(6) An increase in the number of Customs officers and the extension of the hours during the day when goods may be removed, so that they may be cleared more rapidly.

(7) Simplification of the formalities for permission for a vessel to discharge into lighters.

The memorial also makes recommendation for measures against the pilferage of goods on board ships and in the dock area.

**Gulf Ports Association.**

A new Association of American Port Authorities has been formed, embracing the United States ports along the coastline of the Gulf of Mexico, viz.: Tampa, Pensacola, Mobile, Pascagoula, Gulfport, Baton Rouge, New Orleans, Lake Charles, Beaumont, Houston, Galveston and Corpus Christi.

## *The Institution of Civil Engineers*

### *Formation of Maritime Engineering Division*

The Council of the Institution of Civil Engineers have announced the formation of a Maritime Engineering Division on similar lines to those adopted for other branches of engineering work.

As set out in a syllabus which has been circulated,

" The objects for which the Maritime Engineering Division is constituted shall be to promote:—

(a) The advancement of the science and art of Engineering in relation to the development of Harbours and Ports, the construction of Docks and Quays, Coast and Estuary Protection and the Reclamation of Land from the Sea..

(b) The holding of meetings of the Division during the course of the Institution Session for the reading and discussion of communications upon subjects relating to Maritime Engineering.

(c) The organisation of summer or autumn meetings of the Division in London, or elsewhere, if thought desirable, and of visits to engineering works.

(d) The publication of papers, communications or other documents in the Institution Journal or otherwise.

(e) The fostering of research relating to Maritime Engineering developments.

The inaugural meeting of the Division will take place on Tuesday, 13th February, 1945, at 5.30 p.m., at the Institution, Great George Street, Westminster, when a Paper on " Two New Quays at Tyne Dock, South Shields," by Mr. A. L. Harvey, M.C., B.A., M.Inst.C.E., will be presented for discussion.

In view of the important part which engineers are playing and must play in all future planning, the Council of the Institution of Civil Engineers have also appointed an Institution Committee to be known as " The Town and Country Planning Committee " to advise the Council on matters relating to the engineer's part in town and country planning. This takes the place of a Sub-Committee of the Public Relations Committee, which had been dealing with this matter previously. The new Committee will include members who are city engineers and borough surveyors, and others who have specialised on road, railways, docks, water supply, drainage, including sewage disposal and electricity and gas services.

**New Works at Brazilian Port.**

Reports in the Brazian press sho wthat work has been commenced on improvements at the Port of Sao Francisco do Sul, the authorised cost of which is limited to $33,974,000.

**Tees Conservancy Commission.**

Lord Leathers, the Minister of War Transport, has appointed Mr. George West Byng as his representative on the Tees Conservancy Commission. Mr. West Byng, a resident in the district, was originally elected a Commissioner in 1943. He has taken a prominent part in the activities of the Development Committee of the River Authority, of which he is chairman. He is a Barrister-at-Law and an Executive Director of Messrs. Dorman, Long & Co., Ltd., the well-known firm of iron and steel manufacturers.

**Douglas, Isle of Man—Harbour Improvements.**

Mr. R. C. Cain, M.L.C., J.P., H.M. Receiver General for the Isle of Man and Chairman of the Isle of Man Harbour Commissioners, recently moved in Tynwald, the Isle of Man Legislative Assembly, a vote for the sum of £10,800 to carry out preliminary work in connection with the proposals to stabilise the North side wall and at the same time to widen the Victoria Pier by 20-ft. throughout its length of 860-ft. This scheme is designed to strengthen the length of the Old Pier which is defective, to enable additional shelter accommodation to be provided and to improve the berthing facilities and to alleviate traffic congestion.

Tynwald approved of such scheme in principle, which it is estimated will cost £185,000, and passed the vote for the preliminary work to be put in hand. It is hoped to start the scheme proper immediately after the cessation of hostilities.